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ABSTRACTS OF TUBERCULOSIS

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Postoperative Massive Collapse of Lung.—Bradford defines this as "an unusual condition in which the lung, without the presence of any gross lesion such as bronchial obstruction, pleural effusion, etc., interfering with the free entry of air, becomes airless to a greater or less degree and therefore useless for respiratory purposes." It occurs after abdominal operations, as well as after injuries to the chest and trunk, fracture of the pelvis and gunshot wounds of the chest. The collapse may involve a whole lung, one lobe or a portion of a lobe, or both lungs. It occurs from one to four days after operation or injury, but usually within the first twenty-four hours, lasting from a few days to several weeks. It may be complicated by areas of pneumonia in the collapsed lung or bronchial inflammation. The onset is sudden with dyspnea, varying in severity. Cough and expectoration depend on the presence of bronchitis or pneumonia. Physical signs include cyanosis, partial or complete immobility of the affected side of the chest and displacement of the heart and mediastinum to the affected side; the last is the most characteristic sign. Over the collapsed lung there is dulness to flatness, breathing is diminished, absent or bronchial, and vocal fremitus is diminished, absent or increased. Râles are variable, becoming numerous as the lung reëxpands. The X-ray shows a diffuse, dense shadow over the affected side with displacement of the heart and mediastinum; the diaphragm on this side is high and immobile. Later pictures will show a restoration of normal conditions. A case record of massive collapse of the right lung following a stab wound in the abdomen, together with X-ray reproductions, is included. The theories of the cause of this phenomenon are mentioned and it is thought that many so called postoperative pneumonias are in reality cases of massive lung collapse.—*Postoperative Massive Collapse of the Lung, H. Elwyn and J. Girsdansky, J. Am. M. Ass., August 26, 1922, lxxix, 718.*

Dextrocardia in Pulmonary Sclerosis.—A patient had complete dextrocardia. He had pulmonary sclerosis of pleural origin. The X-ray picture showed a left thorax completely free from the heart and an intense right-sided pleuritis.—*Sclerose pulmonaire avec dextrocardia par traction, Bigard and Costa, Soc. Méd. d. Hôp. d. Paris, July 7, 1922, Reported in Presse Méd., July 12, 1922, xxx, 591.*

Water Content and Blood Changes in Tuberculosis.—Tissues of the tuberculous have a low water content. Some have a very high erythrocyte count and high hemoglobin index. A series of patients was examined for many days, twice a day, for albumen and sodium chloride of the blood serum and hemoglobin. Twenty-four hour specimens of urine were measured and the body weight was taken twice daily. Incipient cases did not show any deviation from the normal as regards blood and urine. In advanced cases, an increased concentration of blood was observed in almost all cases. The serum-albumen in these cases was between 8 and 9 per cent, while the normal content is 7 per cent. With progression of the disease and temperature elevation, the weight is reduced and the serum-albumen reaches 5 to 6 per cent. The hemoglobin is decreased markedly at the same time. Tuberculin injections in normal persons did not influence the blood and body weight in any way, while in the tuberculous the same injection exerted a marked influence on the water content of the body which lasted for weeks after the injections. In some cases the water content was markedly increased; in others as markedly decreased. Incipient cases belong to the first group while advanced

cases fall in the second class. It was found that tuberculin injections produce two distinct reactions, depending on the stage of the disease. Injections of 2 mgm. of arsenic, in the form of Ziemssen's solution, produced the same changes in water content of the body as tuberculin. Sodium chloride, sodium bicarbonate and glucose solutions behaved like arsenic and tuberculin, when injected intravenously in 2 cc. amounts of a 10 per cent solution of each substance. —*Wasserhaushalt und Blutveränderung bei Tuberkulose, R. M. Bisch, Klin. Wchnschr., 1922, i, 1879.*

Blood Destruction during Exercise.—The following changes have been demonstrated to take place in the blood of dogs during exercise: 1. An increase in the percentage of cells and hemoglobin in the blood of the jugular vein occurs early in the course of exercise. It probably results from a redistribution of red corpuscles with an increase in their proportion in the peripheral blood. 2. As exercise is continued there is a definite increase in plasma volume. 3. A coincident decrease both in the total cell volume and the pigment volume during prolonged exercise suggests that blood destruction then occurs.—*Blood Destruction during Exercise, G. O. Brown, J. Exper. Med., November, 1922, xxxvi, 481.*

Blood Destruction during Exercise.—A great decrease in total circulating hemoglobin and red cell volume occurs in dogs long maintained under sedentary conditions when they are exercised vigorously during several consecutive days. This would appear to be consequent on increased blood destruction unrepaired for the time being.—*Blood Destruction during Exercise. II. Demonstration of Blood Destruction in Animals Exercised after Prolonged Confinement, G. O. Brown, J. Exper. Med., January, 1923, xxxvii, 113.*

Albumose-Like Substances in the Blood.—Metaphosphoric acid gives a higher nitrogen residue than phosphomolybdic acid, the difference being attributable to the presence of albumose-like substances. Six cases of severe tuberculosis, all with remittent fever, were examined, and three of them revealed increased albumose values in the blood (10–15.5 mgm. *N*/100 g.; normal = 1–7.5 mgm. N/100 g.) and albumosuria; in the remaining three these findings were lacking.—*Über das Vorkommen von Albumoseähnlichen Stoffen im Blute unter physiologischen und pathologischen Verhältnissen, E. Wolff, Inaug. Diss., Lund (Sweden), 1920, Abstracted from Centralbl. f. d. ges. Tuberk-Forsch., June, 1921, xv, 322.*

Blood Picture of Tuberculosis at High Altitudes.—Studies were made on (1) healthy men and women; (2) tuberculosis cases of all forms and stages, examined twice, namely, within the first twenty-four hours and at the termination of the cure; and (3) tuberculosis of all forms and stages examined 3 to 4 times or more during the first twenty-four hours, after eight and fourteen days, and at the end of the cure. In all, 20 healthy men, 20 healthy women, 200 patients of a first series and 150 patients of a second series were examined. Comparative studies with various methods were made on 22 healthy men and women. Caution was exercised in obtaining the blood specimens under exact and definite conditions. The hemoglobin was determined by the Sahli method, the counts were made in Thoma and Breuer chambers, and differential counts by Giemsa staining after methyl alcohol fixation. The results obtained were an increase in the red cells and hemoglobin, corroborating previous observations, but the increase was not so great as previously reported. Only numerous examinations excluded errors through individual variations and gave an average increase. Two types were thus discovered; (1) a primary increase in the red cells with secondary hemoglobin increase, and (2), more rarely, no change in the red cells with individual hemoglobin increase. Colloidal changes only can explain the presence of both types. In a large percentage the Weigert rule of "pathological regeneration" is confirmed. While mild tuberculosis cases as well as healthy people react to the action of higher altitudes, the normal reaction is influenced in the more severe cases by the disease. Prognostic conclusions can be drawn only from marked deviations. The white cell picture in healthy individuals gives essentially the so called "white blood picture of high altitudes," with a diminution of the neutrophiles and a relative increase of the lymphocytes and slight coincident increase in the mononuclears. With progression of the disease and with complications, the neutrophile increase and leucocyte decrease are to be looked upon as unfavorable prognostically. In this respect, however, every case must be individualized and every scheme is to be discarded. There is no characteristic white blood picture for tuberculosis in higher altitudes which will be of value in judging the disease.—*Das Blutbild der Tuberkulose im Hochgebirge, W. Knoll, Beitr. z. Klin. d. Tuberk., January 14, 1922, xlix, 320.*

Cyanosis and Pneumonosis.—The primary and secondary causes of cyanosis are discussed. In the latter class are discussed: (A) increased oxygen utilization in the

capillaries by (1) increased oxygen demand and (2) diminished circulation; (B) deficient oxidation of arterial blood by (1) changes in the respired air, (2) changes in the blood itself, (3) admixture of blood as in congenital heart disease, (4) diminished pulmonary aeration, (5) diminution in the respiratory surface and (6) degenerative changes in the repiratory surface or *Pneumonosis* (Brauer). The animal experiments consisted in administering chloramine intravenously to cats under urethane, and determining oxygen with the Barcroft apparatus according to Franz Müller. Urethane alone caused a diminished oxygen content of arterial blood. Decerebrated cats did not live long enough to serve the purpose; so dogs were used with local anesthesia but they did not prove entirely satisfactory, even though, histologically, an edema was fouud. The alveolar epithelium revealed no changes. Chlorine inhalations were then utilized in cats and dogs with local anesthesia. It was found difficult to regulate the dosage, so that an oxygen diminution occurred without fatal pulmonary edema. Finally, morphine was used in dogs to prevent a compensatory dyspnea. The morphine prevented a hastening of respiration, and there occurred a definite decrease of the oxygen content of arterial blood after chlorine inhalation. It is concluded that changes can occur in the lungs, not visible microscopically, which can alter the oxygen permeability. The aim of the experiments was to determine whether a degenerative destruction of the alveolar epithelium in the sense of *Pneumonosis* can hinder diffusion, so that a diminished oxygen content of the arterial blood, which reveals itself in man as a cyanosis, can occur. The author believes that this was achieved in dogs. The experiments are to be carried further.—*Über das Problem der Zyanose und den Begriff der Pneumonose, J. Schjerning, Beitr. z. Klin. d. Tuberk., March, 1922, l, 96.*

Vital Capacity in Pulmonary Tuberculosis and Other Affections.—The vital capacity findings in a group of cases is graphically charted. Certain patients, with minimal or moderately advanced pulmonary tuberculosis, were found to show a vital capacity within normal limits, a fact to be explained in one or all of the following three ways: 1. Some of these patients had overdeveloped vital capacities, and, although they were later reduced considerably, they still had capacities which appeared to be within normal limits. 2. In a few cases the tuberculous foci were definite but clinically insignificant. 3. It is suggested that the normal standards now employed are not quite applicable for the people of all parts of the United States. Apparently the people of the United States, particularly of the Middle West, have a greater vital capacity than the people of England. In this study, vital capacity readings were taken in 335 cases suspected of having pulmonary tuberculosis, and stereoscopic plates were made in 210. In 30 cases, in which stereograms showed no evidences of disease, the mean vital capacity was 102 per cent of the normal, while the range was between 82 and 122 per cent. Stereographs showed peribronchial tuberculosis in 39 cases; the average vital capacity was 97 per cent, and the range was from 81 to 121 per cent of normal. In 71 cases with unilateral and 70 with bilateral parenchymatous tuberculosis, the vital capacity percentages decreased as the extent of the disease increased. Physical examination in 62 cases revealed no evidence of pulmonary tuberculosis; 10 per cent of these had a vital capacity between 70 and 80 per cent of normal, while the remainder were within normal limits. On physical examination the diagnosis was reserved in 28 cases. About 4 per cent of these had vital capacities between 70 and 80 per cent of normal, and in about 3 per cent the readings were between 80 and 90 per cent, the remainder being within normal limits. There were signs of minimal tuberculosis in 72 cases, moderately advanced in 100, and far advanced in 73. In most of these, the vital capacity was decreased in proportion to the extent of the involvement. X-ray pictures showed pulmonary cavities in 30 cases; in these, the mean vital capacity was 64 per cent, while the range was between 31 and 109 per cent of normal. Nine cases had spontaneous or artificial pneumothorax; the mean vital capacity was 49 per cent and the range was between 32 and 58 per cent of normal. Readings were taken in 20 cases of bronchial asthma. During the attacks the vital capacity was reduced to as much as 18 to 20 per cent of normal but, after the attacks subsided, the readings returned to normal in all cases except 4 with emphysema and 3 beyond the age of fifty. Observations were made on twenty patients with pneumonia. The lowest vital capacity reading was 17 per cent of normal (fifth and sixth days of disease) and the highest was 93 per cent, which occurred in another case on the day of discharge from the hospital. There was little relation between extent of the pneumonic involvement and reduction of vital capacity. The test is a valuable aid in the early diagnosis of pneumonia, since there is probably no other acute respiratory disease which so reduces the vital capacity from the beginning. During the clearing up of the

disease the vital capacity gradually increases; in the presence of delayed resolution or complications it fails to increase. Every pneumonia patient should remain reasonably inactive in the hospital or the home until the vital capacity has reached at least 90 per cent of the normal. Observations were made on 60 patients with paratyphoid fever. Fifteen of these had vital capacities below normal limits, due in half of such instances to complications such as pleurisy or lung involvement. The vital capacity often suggests such beginning complications. In 85 per cent of the cases the vital capacity was within normal limits.—*Studies on the Respiratory Organs in Health and Disease. VI. The Significance of the Vital Capacity Test in Pulmonary Tuberculosis, Bronchial Asthma, Pneumonia and an Acute Infection Outside the Respiratory Tract, J. A. Myers, Arch. Int. Med., November 15, 1922, xxx, 648.*

Vital Capacity in Health and Heart Disease.—In the observations reported, West's formula for calculating the normal vital capacity was used. According to this, the normal for men is 2.5 litres per square metre of body surface and for women 2 litres, the body surface being determined from the height and weight by the formula of Dubois and Dubois. A study of 100 normal men showed that vital capacity is definitely influenced by the age of the subject; it reaches its maximum in the third decade. A marked lowering was not noted until after the age of sixty. In three men over seventy years old the vital capacity was only 56 per cent of normal. Subjects may vary considerably from the average vital capacity for their age, height and weight, and still have no disease, and the readings may vary for the same person from time to time. Nine persons were tested over periods ranging from fourteen months to three years and four months. Among the 7 men in this group the variation ranged from 100 to 550 cc. while the 2 women showed a variation of only 50 and 25 cc., respectively. In one patient, who in the beginning had active pulmonary tuberculosis, the vital capacity observations span a period of sixteen years. At first the reading was 74 per cent of normal; the patient recovered, but nine observations showed a varation in vital capacity of only 125 cc. in the sixteen years. The vital capacity in 100 persons, both men and women, who had organic heart disease and in 100 other persons who had normal hearts are compared. The mean reading for the 100 normal persons was between 3500 and 4000 cc. while the mean for those with abnormal hearts was between 1500 and 2000 cc. No one with a healthy heart had a vital capacity below 1500 cc., while 18 of those with heart disease fell below this level. No one with a diseased heart had a vital capacity above 4500 cc. and only 5 of the 100 above 4000 cc.; 11 per cent of those with healthy hearts had a vital capacity above 4500 cc. A group of male patients with abnormal hearts and with symptoms of cardiac weakness had an average vital capacity 1000 cc. lower than another similar group without such symptoms; among the females no difference was noted. Since 1917, the variations in the vital capacity of cases of heart disease have been followed. When cardiac insufficiency of the congestive type existed, the vital capacity followed closely the change in the clinical condition. It has proved to be a good index of the amount of reserve power possessed by the heart and a distinct aid in treatment and prognosis. Four case records with graphic charts of variations in vital capacity in each case are included.—*Long-Continued Observations on the Vital Capacity in Health and Heart Disease, J. H. Pratt, Amer. J. M. Sci., December, 1922, clxiv, 819.*

Respiratory Gas Exchange and Pulmonary Circulation.—In diseases of the lung there occurs a compensatory overventilation, the result of which stands in close relation to circulatory changes in the diseased areas. If an area of pulmonary tissue, cut out of the respiratory portion of the lung, retains its usual or an increased blood supply, then, in spite of the overventilation, there occurs a disturbance of the respiratory gas exchange; the blood flowing through the nonbreathing lung remains venous and mixes with the arterial blood from the respiring portion, and thus there results a diminution in oxygen saturation. With retraction and collapse of any part of the lung its blood content diminishes and the capillaries of the respiring portions are then filled to a greater extent; and the compensatory overventilation causes an undisturbed gas exchange. For this reason, with a unilateral closed pneumothorax, there occurs only a slight deficiency in oxygen saturation of the blood. Therefore, encroaching changes in the chest cause very little harm to the gaseous exchange, as long as the respiratory function of the respiring pulmonary portions are not affected. The most marked effect on the gaseous exchange occurred in pulmonary edema and damage to the air passages; overventilation cannot act in these cases, since the exclusion of the respiratory surfaces goes hand in hand with conservation of the circulation. Stasis in the pulmonary circulation

without pulmonary edema does not in itself disturb the respiratory gas exchange. The permeability of the gaseous exchange membrane is not effected by the stasis. In a pronounced case of pulmonary emphysema the respiratory gaseous exchange was not appreciably altered. The disturbance of the gaseous exchange by disease of the lung tissue only rarely comes into consideration as a cause of death.—*Respiratory Gasaustausch und Lungendurchblutung unter normalen und krankhaften Zuständen der Atmungsorgane. Untersuchungen am arteriellen und venösen Blut von Mensch und Tier, E. Le Blanc, Beitr. z. Klin. d. Tuberk., March, 1922, l, 21.*

Air Embolism.—It would probably not occur to most physicians that air emboli following such common procedures as exploratory puncture, irrigation of an empyema cavity, or change in position of a drainage tube, might endanger life. Roger first drew attention to these accidents in 1864, but concluded that the symptoms were of nervous origin; this opinion was concurred in by other French physicians, and the reaction was spoken of as "pleural eclampsia" or "pleural epilepsy." The first clinical experiences were gained from accidents following irrigation of an old empyema cavity or diagnostic puncture of the chest. The initial symptoms, such as visual disturbances, paresthesias, headache and dizziness were followed by tonic or clonic contractions, and abnormalities in heart action or respiration. If a sudden change in the clinical picture did not take place, death resulted. Autopsy very often revealed nothing positive. When the patient recovered, a paralysis very often persisted, and occasionally aphasia or blindness. It is interesting to note that in all the empyema cases showing this complication there was bleeding from the cavity, showing that a mechanical lesion of the fibrous wall or its granulating surface had occurred. Brandes in 1912 published the report of a case in which he tried to outline the extent of an empyema cavity by an injection of bismuth paste through its sinuses. The patient had a convulsion, with deviation of the eyes, and died after twenty hours. At autopsy, bismuth was found in the smallest blood vessels of the cerebral cortex and, on serial sections from the walls of the sinus, could be traced up to the pulmonary capillaries and veins. The first clinical observations of what proved to be experimental air emboli, unintentionally produced, were made in cases of accident in pneumothorax therapy for tuberculosis. Brauer, in 1912, was the first to recognize the danger of air embolism in thoracic work and rejected the opinion held by Roger and others as to these so called pleural reflexes. Forlanini had maintained the old conception of the nervous origin of the convulsions. Spengler, Saugman, Giesemann, Sundberg, van Voornveld, and others generally accept air embolism as the cause of these fatalities. Jessen believes that it occurs more frequently than is generally recognized. The first puncture presents the greatest risk, but in cases of partial pneumothorax the danger is always present; for the needle may pass into a strand of adhesions or pierce infiltrated lung tissue. Forlanini had, in 10,000 punctures on 134 patients, 12 accidents, 5 with temporarily serious conditions, but all recovered. Saugman records 970 operations on 54 patients without complications, but in a second series of 215 first punctures and 5500 follow-up treatments there were 2 cases of embolus. In one case the needle was supposed to be obstructed, the patient took a deep breath, and the stylet, on being withdrawn, showed blood. The patient became dizzy, then pale and lost consciousness. There were ocular deviation and pupillary changes, and respiration and heart action became irregular, followed by death. At autopsy a mechanical lesion in the lung tissue was found, with bloody suffusion of the whole area, and microscopic examination showed the damaged vein. In the vessels at the base of the brain gas bubbles were found. Among other intrathoracic procedures in which such complications may occur are decortication (Delorme, Fowler) and Ransahoff's discission of the pulmonary pleura. In these operations many blood vessels, especially veins in the superficies of the lung, are mechanically injured. In pneumonotomy and pneumonectomy the operation comes nearer to the vessels at the hilum, with the larger veins under negative pressure, at least during inspiration. It has been experimentally demonstrated in animals that from irritation of the normal pleura we do not get a constant specific reaction by way of the central nervous system. Stimulation of the parietal pleura causes only protective movements, or in the case of small animals local clonic contractions on the same side. Stimulation of the pulmonary or mediastinal pleura is without visible result. The sensory stimuli are carried centripetally by fibres of the vagus nerve. In long standing empyema, however, these fibres are strangulated by the encircling fibrous tissue, and the only sensitive elements are the sympathetic nerves running with the vessels, stimulation of which has no influence on the protective movements. In the walls of an empyema cavity there are, however,

blood vessels suspended between fibrous strands. When their walls are mechanically injured the veins cannot contract fully, being hampered by their inelastic attachments and weakened musculature, the opening persists, air or gas enters, either from the hollow of the needle or from the neighboring cavity, and we have an air embolism. Not all such emboli become manifest, because the friction exerted by the air on the vessel wall causes reflex vascular contraction and checks movement, unless the sucking action from a larger branch of a pulmonary vein overcomes this resistance. The distance between the point of the mechanical lesion and the junction with a larger vein under negative pressure is the essential factor. When the accident happens in pneumothorax induction, the embolism is more dangerous if the air is flowing through the needle under pressure. In thoracoplasty the same physiological and pathological factors play a part as in empyema. The knife or blunt dissecting finger is always the primary faulty agent. Where there is a chronic inflammatory condition of the lung some veins may be thrombosed and operation may mobilize the thrombi. In most cases of air emboli there is evidence of excitation of the motor areas, such as clonic or tonic convulsions beginning in the eye muscles or upper extremity and often becoming generalized. Ophthalmoscopic examination during an attack or later at periodic intervals may reveal gas bubbles passing through the arteries of the retina or fine silvery lines due to the presence of air in the centre of the lumen of the vessels. The spasms are due to nutritive changes in the cerebral motor cortex. Albumin and casts may appear in the urine as a result of temporary blocking of the renal system. In all accidents accompanied by the symptoms described one should think first of air embolus. Blood on the stylet after chest puncture is additional evidence. The prognosis in any case depends on the amount of air entering the blood stream and the region of the brain involved. *Summary:* 1. Following various diagnostic and therapeutic procedures on the chest, complications may ensue which have been proved experimentally and clinically to be caused by air emboli. 2. The sudden release of a great amount of fluid in emaciated and neurotic people may cause a similar but less serious clinical picture which is probably due to shock. 3. It has been experimentally shown that we have no pleural reflex which would explain these complications. 4. The pathological condition of the lung and pleural sheaths is the same in all these cases—local damage to fixed and distended vessels, so located as to permit of aspiration from a larger pulmonary vein under negative pressure. 5. The clinical pictures show a wide variety. Ophthalmoscopic, stool and urinary examinations are desirable. 6. The best therapy is a preventive one. When an embolus occurs, stop the operation; lower the patient's head; reinforce the heart's action. Adrenalin injections intravenously are indicated to accelerate the cerebral circulation.—*Air Embolism Following Various Diagnostic or Therapeutic Procedures in Diseases of the Pleura and the Lung, K. Schlaepfer, Bull. Johns Hopkins Hosp., September, 1922, xxxiii, 321.*

Fat Metabolism in the Lung.—The neutral fat formed during digestion passes almost entirely by way of the chyle ducts through the mesenteric lymph nodes, where a portion of it is retained, and thence by way of the thoracic duct and left subclavian vein to the right heart, by which it is thrown into the pulmonary circulation. The lung, therefore, is the first great organ encountered by the fat, just as the liver is the first great organ encountered by the proteins and carbohydrates. It is, consequently, not surprising, in the light of our new knowledge of the multiple functions of many organs to which we formerly attributed a single rôle, to learn that the lung acts upon the fat in a manner which is analogous to the action of the liver on the food substances carried to it. Experiments were made to determine the relative quantities of fat in blood taken simultaneously from the right heart and the femoral artery. In all cases there was a loss of fat in the blood during its passage through the lungs; the loss was equal to 25 per cent in some cases; the average loss for all experiments was 9.8 per cent. This arrest of fats is, therefore, one of the normal functions of the lungs. Digested with various tissue extracts, fat is broken down by many of them, the percentage of loss being greatest in the liver, next greatest in the lungs and next in the mesenteric lymph nodes. A rich supply of fatsplitting enzymes was also obtained from a glycerine extract of lung tissue. Hence, it may be concluded that the fats of alimentary origin are in large part fixed in the lungs which act as a base for the supply of fats to the body cells.—*Le métabolisme des graisses: lipopexie et lipodiérèse pulmonaires, H. Roger and L. Binet, Presse Méd., April 1, 1922, xxx, 277.*

Peritoneal Pain Sense.—The chief purpose of the experiments recorded was to determine the localization of pain from stimulation of the parietal and diaphragmatic peritoneum. The method used was that employed previously by one of the authors

in the study of sensation in the pleural cavity. After partially anesthetizing the skin with ethyl chloride, a trocar is inserted through the abdominal wall until the end moves about freely. The point is withdrawn, and through the cannula is passed a long silver wire, one end beaded and smooth, the other end relatively sharp. Each end is slightly curved in order that it may more easily be brought in contact with the abdominal wall. In the earlier experiments, patients with ascites were chosen, but recently air has been injected. This forces the hollow viscera to the bottom of the cavity, leaving a large domelike area free for testing. The air also fills the subphrenic spaces and permits the passage of the wire to the under surface of the diaphragm, a region not accessible in ascites. *Summary:* 1. The parietal peritoneum, and its underlying serosa, so far as explored, namely, all the anterior median areas and the lateral areas as far as the anterior superior spines, are sensitive to pain from strong pressure of a smooth point or light pressure or lateral movement of a rough point of wire. 2. The pain elicited by stimulation of the parietal peritoneum is localized with considerable accuracy by the patient, the error being less than one inch. 3. These observations confirm the conclusions of Ramström and Lennander that the parietal peritoneum is devoid of pressure sense. The peritoneum covering the diaphragm is devoid of pressure sense, as applied by light contact or stroking of a beaded wire point. But to strong pressure with a beaded point or light contact with a rough point it is acutely responsive to the sense of pain. 5. The localization of pain from stimulation of the diaphragmatic peritoneum is never in the diaphragm itself. It is always referred to some distant part. Stimulation of the outer margin causes diffuse pain over the lower costal region and subcostal abdominal wall. Stimulation of the central portion produces pain over a sharply limited point somewhere along the trapezius ridge. These impulses are doubtless carried by afferent fibres of the phrenic nerve to the cervical cord and thence referred to the neck by the sensitized cutaneous nerves of the fourth cervical segment. This pain has not been observed along the course of the phrenic nerve itself.—*Experimental Observations on the Localization of the Pain Sense in the Parietal and Diaphragmatic Peritoneum, J. A. Capps and G. H. Coleman, Arch. Int. Med., December 15, 1922, xxx, 778.*

Ethereal Sulphates in Urine.—It has been suggested that "short fevers" and certain gastrointestinal upsets, occurring in the course of pulmonary tuberculosis, are not uncommonly associated with some degree of intestinal stasis. The index of the stasis consists chiefly in the quantity of ethereal sulphates in the urine. These can be detected by treating the urine with a small amount of hydrogen peroxide and then adding chloroform and concentrated hydrochloric acid. The indican (indigo blue) present colors the chloroform blue and skatoxyl is shown by the presence of a rose-colored supernatant fluid. A small series of cases were treated with salol or a combination of calomel and magnesium sulphate. In some instances this resulted in a reduction in the amount of sulphates present, but no definite relationship between temperature and ethereal sulphates was found. Realizing the inaccuracies of the above test, on account of difficulties in estimating the shades of color present, some quantitative estimations were done. For this the method of Plimmer, with some modifications, was used. Three out of four cases, given calomel and magnesium sulphate, showed a very definite reduction in the ethereal sulphates present but there was no associated fall in temperature. Although the quantity of ethereal sulphates in the urine can be controlled by the administration of calomel, this does not necessarily have any effect on the fever in chronic cases.—*On the Presence and Quantity of Ethereal Sulphates in the Urine of Tuberculous Patients and the Relation Which They Bear to the Degree of Pyrexia, N. D. Ball, Tubercle, September, 1922, iii, 540.*

Elimination of Bacteria from Respiratory Tract.—In discussing the whole question of the protective mechanism of the upper air passages and its significance in relation to the spread of infectious disease the following factors are considered: (1) anatomic relations, (2) the flushing mechanism, (3) bactericidal action of secretions, (4) reaction of secretions, (5) the antagonistic action toward invaders of the indigenous flora, and (6) phagocytosis. *Mouth:* Its anatomic structure does not in itself seem designed to prevent invasion. A host of foreign bacteria is continually entering the buccal cavity. But in normal persons cultures do not reveal the diverse and variable flora which would be expected, but a relatively simple and constant one. There is evidently a rapid and effective elimination of the horde of incoming germs whereby they are segregated from the normal indigenous flora. This is accomplished mainly by a system of flushing which operates by the gross act of swallowing, thus propelling ingested material into the esophagus, and by the more highly organized suction cur-

rents the paths of which also lead always toward the esophagus. The bactericidal action of the saliva is certainly of some importance. Where this action is not present there may be an inhibitory or bacteriostatic effect. The reaction of the mouth secretions, apart from their other qualities, does not favor most foreign bacteria. In addition, there is some evidence to support the view of antagonistic action against foreign bacteria by the normal mouth flora. The last line of defense is the protective activities of the body fluids and cells. *Nasal Passages:* Here anatomic considerations are of vast importance. Entry of bacteria almost always follows the inhalation of bacteria-laden dust or droplets; direct introduction rarely occurs. Most of the inhaled bacteria are arrested, probably by the network of moist vibrissae, very near the anterior nares. Bacteria which do penetrate are promptly caught up and swept by the current of the ciliated epithelium toward the pharynx and esophagus. Thus we have en effective self-cleaning filter which purifies the air of bacteria before it enters the lungs. *Lungs*: In health few or no bacteria are present below the larynx. Dust, carbon and metal particles, however, do reach the lung, but it is only the occasional germ which penetrates. The protective mechanism includes two main factors: (1) an anatomic structure which cuts off most of the organisms from the inspired air, and (2) a process which destroys or eliminates the few which do penetrate. The former is the highly effective but not infallible filter mentioned above. Regarding the latter, three possibilities must be considered. The bacteria may be removed, they may be destroyed in the lung or they may set up disease. Besides the mechanical removal effected by the ciliary current many bacteria are removed by lymphatic drainage. Others may die *in situ*. The factors which lead to failure of the protective mechanism are dosage, anatomical features and injuries, absence of "lag" (a state of inhibition of the germs) and virulence. In experimental infection, in the vast majority of cases dosage is the determining factor. The protective mechanism is apparently more effective against a smaller than a larger dose of foreign pathogens. When bacteria exist in a highly vegetative state the chances of colonization are greater. That a highly virulent germ possesses intrinsically any greater invasive power than a less virulent one is not conceded, but in the case of the former a much slighter injury or defect is adequate to allow invasion. While the virulence of a germ may establish the mortality rate among those infected, in the last analysis the production of disease seems to be made possible by an injury or defect which is more or less independent of the bacteria. Injuries important in the production of respiratory infection are thermal injuries and infections. Mechanical and chemical injuries play a minor part. Thermal variations lead to marked vasomotor and secretory changes in the upper air passages. Infection is most important. The rôle of influenza, smallpox and the exanthemata in general in allowing secondary infection is notable. The author concludes that the microörganism is, on the whole, at a disadvantage and that no special response is, as a rule, required to dispose of it, but that special favoring circumstances for the organism must be present before infection can take place.—*The Mechanism of Elimination of Bacteria from the Respiratory Tract, A. L. Bloomfield, Amer. J. M. Sci., December, 1922, clxiv, 854.*

Action of Dead Tubercle Bacilli.—Koch demonstrated the presence of agglutinins for bacillary emulsions in previously infected animals, but he never succeeded in immunizing a guinea pig against virulent tubercle bacilli with O. T. or with bacillary emulsions. Much also failed to produce immunization with his lactic acid unlocked tubercle bacilli (Milchsaüreaufschliessung der Tuberkelbacillen) from which he prepared his partial antigens. To study the immunizing action of dead tubercle bacilli a series of 32 guinea pigs were inoculated with the following: (1) tubercle bacilli treated with lactic acid according to Much; (2) tubercle bacilli rendered avirulent by treatment with 0.5 per cent phenol (these bacilli when untreated rendered nine guinea pigs immune to large reinfecting doses); (3) tubercle bacilli killed by chloroform and treated for three days with pepsin; (4) tubercle bacilli killed by chloroform and treated for three days with trypsin. All 32 guinea pigs showed no sign of immunity and succumbed to an infection with virulent tubercle bacilli in the same manner as the control animals. Concerning the possibility of rendering guinea pigs susceptible to tuberculin, as Much claimed to have accomplished by the treatment of the animals with his partial antigens, the author in a previous article found that Much mistook the tubercle protein anaphylaxis for susceptibility to tuberculin, the two being very closely related in their manifestations. To prove his contention, the author injected guinea pigs intravenously with large doses of dead tubercle bacilli and after one to four months injected them intravenously and intracutaneously with large doses of O. T. and dead tubercle

bacilli. The animals showed neither anaphylactic phenomena nor susceptibility to tuberculin. It is therefore the tuberculin content of the dead bacilli and the Much's antigens which is responsible for their action on a tuberculous host.—*Die Wirkung abgetöter Tuberkelbacillen, H. Selter, Klin. Wchnschr., February 25, 1922, i, 418.*

Action of Dead Tubercle Bacilli.—The immunizing properties of (1) "lactic acid unlocked" tubercle bacilli (Much), (2) tubercle bacilli treated with 0.5 per cent phenol, (3) chloroform-killed and pepsin-digested bacilli (3 days), and (4) chloroform and trypsin-treated bacilli (3 days) were tested. None of the guinea pigs treated with these substances revealed an immunity nor did they show tuberculin hypersensitiveness after one to four months. Only mild anaphylactic symptoms were noted in these animals. The tuberculin reaction occurring in a hypersensitive body following the administration of tuberculin is not an antibody reaction, but an inflammatory reaction of a hypersensitive tissue, resulting from the irritation produced by the tuberculin, without the tuberculin being bound to the tissue cells.—*Über die Wirkung abgetöter Tuberkelbacillen, H. Selter, Ztschr. f. Hyg., February, 1922, xcv, 233.*

Histological Studies on Action of Acid-Fast Bacilli.—The organs of 137 guinea pigs infected in various ways, with 12 different strains of acid-fast bacilli (Rabinowitsch I, Korn's butter bacillus, Moeller's timothy bacillus, avian bacillus, turtle strains Piorkowsky and Friedmann, human strain Arloing, two old laboratory strains of human and recently isolated human and bovine strains) were examined. In all cases typical tuberculous changes were found, with marked deviations in certain cases (no caseation, but individual necrosis, in nodules, large mononuclear cells in regular order, numerous interspersed lobated nuclear leucocytes, etc.). These deviations lost their value since they were also found in animals inoculated with genuine tuberculosis.—*Histologische Untersuchungen über die Wirkung saürefester Bacillen, R. Joffé, Centralbl. f. allg. Pathol. u. pathol. Anat., July, 1921, xxxi, 564.*

Acid-fast Saprophytes.—Trumpet bacilli (*Trompeten Bacillen*) are a vegetative modification of an acid-fast saprophyte, widely distributed in earth and water. To the same class belong the so called turtle, blindworm, and fish tubercle bacilli and probably also the remaining cold-blooded (frog and salamander) bacilli. The acid-fast bacilli of cold-blooded types were harmless for warm-blooded animals (guinea pig, rabbits and white mice) in not too large single doses. In very large doses, especially after repeated injections, they would produce generalized disease in these animals. In cold-blooded animals the various strains, in large inoculation doses, would produce chronic disease. By preliminary treatment of guinea pigs with trumpet, turtle and blind worm bacilli, no appreciable protection against infection with genuine tubercle bacilli was attained. The immunization results make it seem highly probable that cold-blooded bacilli, inoculated into man, are of no value in protecting against tuberculosis.—*Über einige den Tuberkelbacillen verwandte säurefeste Saprophyten, B. Lange, Veröff. d. Robert Koch-Stiftung, 1921, ii, 134, abstracted from Zentralbl. f. d. ges. Tuberk.-Forsch., April, 1922, xvii, 423.*

Histology of Tuberculous Reinfection Foci.—In Koch's infection and reinfection experiments on guinea pigs, the primarily infected animals developed ulcers and abscesses in fourteen days, while in reinfected animals marked inflammatory reactions occurred at the site of inoculation in one to two days. In reinfected animals, histologically, there was noted an acute inflammation with leucocytic exudation and subsequent necrosis, with phagocytosis of the tubercle bacilli and without swelling of the regional lymph nodes. In the primarily infected animals there was a progressive inflammation, with tubercle occurring after fourteen days. The regional lymph nodes became involved after three weeks and there was no tendency to healing.—*Das histologische Reaktionsbild der tuberkulosen Reinfektion, R. H. Joffé and E. Löwenstein, Beitr. z. Klin. d. Tuberk., March, 1922, l, 129.*

Measuring Resistance to Tuberculosis.—Resistance is considered as a function derived from the ratio of the defense reaction to the intensity of infection. After injecting very small doses of tuberculin, the increase in leucocytes is calculated. The ratio of the increase to the tuberculin dose gives the measure of resistance. In healthy persons and in those with healed and arrested tuberculosis the resistance was positive, with values between 7 and 8. In patients with tuberculosis in evolution, and in cavity and cachectic cases, resistance was negative with values between -1 and -4. This method may perhaps be available not only for prognosis and diagnosis, but for regulating tuberculin therapy.—*Mesure de resistance de l'organisme dans la tuberculose, Trabuc, Meeting Comité Méd. des Bouches-du-Rhone, June 2, 1922, Reported in Presse Méd., July 12, 1922, xxx, 596.*

Immunity Relations in Guinea Pig Tuberculosis.—Inoculations with living tubercle bacilli, leading to a latent or chronic mild tuberculosis in guinea pigs, protects by immunity to a not too severe reinfection. Large reinfection doses cause only a local reaction. If infection does not result from the first inoculation, the animals are not immune and develop the disease, identical with controls, following reinfection. In animals in which definite disease is occasioned by the primary injection, the reinfection can have a detrimental or a healing influence. To produce latent or chronic mild tuberculosis in guinea pigs, bacilli of low virulence combined with unlocked "vital tuberculin" proved suitable. Preliminary treatment of guinea pigs with saprophytic acid-fast bacilli reduces the resistance of the animals so that they are more susceptible to a subsequent infection. In animals, immune as a result of tuberculous disease, subsequently injected bacilli are slowly disintegrated and removed. Whether substances in the serum or cell secretions are concerned and in how far the lymphocytes are involved, cannot be said. The question of how far the body tissues are concerned in the immunity to newly introduced bacilli can also not be definitely answered.—*Die Immunitätsverhältnisse bei Meerschweinchentuberkulose, H. Selter, Ztschr. f. Hyg., February, 1922, xcv, 159.*

Immunizing Effect of Tuberculous Lymph Nodes.—After a review of the controversy regarding the influence of human scrofula upon tuberculous disease in general, there are described experiments to determine the effect of extracts of lymph nodes of animals with an attenuated infection upon the evolution of tuberculosis in other animals of the same species. To prepare the extract 20 guinea pigs are infected with an old potato culture of tubercle bacilli; one month later the enlarged nodes are removed, ground to a pulp and treated with sterile physiological salt solution. The emulsion after standing forty-eight hours is put through a colander and filtered through paper. The clear limpid filtrate is an extract of a yellowish color, and perfectly sterile, and is preserved in an icebox with chloroform. In the first series of experiments a first group of 8 guinea pigs was infected with tuberculosis beforehand and then treated with extract. In a second group of animals the extract was used in the beginning and virulent bacilli later injected subcutaneously. The extract was found to attenuate and retard considerably the development of tuberculosis. There was also a protective action, since animals treated prior to infection survived on the average fifteen days longer than the untreated controls. In a second series of experiments three groups of 9 guinea pigs were treatd with an extract of guinea pig tuberculous lymph node extract, an extract of human scrofulous lymph nodes and an extract of normal calf lymph nodes, respectively. A fourth group of nine guinea pigs served as controls. Each of these groups was further subdivided into three lots of three guinea pigs each. Each lot, except the controls, received the same amount of virulent infection, but the time of virulent infection with relation to the treatment with the appropriate extract was varied. It was found that the guinea pigs, treated both with the tuberculous node extract and with the scrofulous node extract, survived and were finally killed after four months, whereas the controls all died within forty days after virulent infection. The pigs treated with normal node extract survived only about twenty days longer than the controls. The animals treated preventively with the extracts survived longer than those to which the extract was given concomitantly with virulent infection and afterward. In general, the lesions in the animals treated with tuberculous lymph node extract were smaller than those treated with the scrofulous node extract, while in the animals treated preventively with the tuberculous node extract it was impossible to demonstrate any tuberculous lesions microscopically. In a third series of experiments aqueous extracts were prepared from the tuberculous neck nodes of a scrofulous child and from normal lymph nodes of a healthy calf, with a view to determining the presence or absence of complement-fixing bodies. Five different sorts of tubercle bacillus antigens were used, as well as control antigens prepared from other bacteria. Extracts of human tuberculous nodes were found to contain specific complement-fixing bodies in the presence of tubercle bacillus antigens. The author concludes that his experimental results afford further evidence that scrofula and attenuated tuberculosis of the lymph nodes may exercise a vaccinating action against tuberculous infection and at the same time exert a defensive action against the evolution of the disease.—*Le tissu lymphatique tuberculeux et scrofuleux considéré du point de vue de l'action qu'il exerce sur l'evolution de la tuberculose exéprimentale, S. Liverato, Ann. de méd., August, 1922, xii, 93.*

Sensitization with Tubercle Bacilli and Extracts.—An attempt was made to determine whether the tuberculin reaction,

particularly its intracutaneous application, is an expression of a state of general hypersusceptibility or anaphylaxis for tubercle bacillus protein. In this work the anaphylactic reaction was studied by the Schultz-Dale isolated guinea pig uterus drop method. As all tuberculins and, to a lesser degree, protein extracts of tubercle bacilli appear to have more or less of a nonspecific effect on the uterus of normal animals, it was found necessary to use a large number of controls to determine the limits of nonspecific action. The amount of any preparation used in the test was always less than the minimal nonspecific dose. Four different commercial old tuberculins, two control tuberculins and six different tuberculoproteins were used. In regard to the last, not all were biuret free in spite of the utmost care taken in washing the bacilli free from broth. Guinea pigs sensitized to tuberculoprotein *A* usually gave definite reactions to this protein, whereas all were negative to tuberculin, one horn of the uterus being used for one test and one for the other. To determine whether O.T. possessed anaphylactic properties, five guinea pigs were given from one to four injections of this substance. A second group received "control old tuberculin." Two of the first and three of the second group reacted positively to tuberculoprotein *A* with the isolated uterus test. From this it is concluded that the preparation was contaminated with the proteins upon which the tubercle bacilli were grown, although it was biuret-free. Two other groups of guinea pigs were prepared, group 3 receiving injections of old tuberculin, and group 4 "control old tuberculin." Tested against tuberculoprotein *D* and *F* (one horn for each), one of group 3 reacted positively to *D*. There were no reactions in group 4. Experiments were also done to determine the occurrence of hypersensitiveness to tuberculoprotein in the course of a tuberculous infection. A large series of guinea pigs, injected with washed and ground human tubercle bacilli (H 37), showed a fairly general reaction to tuberculo-protein, but the reactions to old tuberculin were uncertain. A final series was inoculated with tuberculous tissues to eliminate the parenteral introduction of liberated tuberculoprotein, simultaneously with the infecting organisms. This method also eliminated the possibilities of sensitization with traces of protein from the medium on which the bacillus is grown. This group failed to react with various tuberculoproteins. All animals showed definite tuberculosis at autopsy. Twelve animals of this series were given tuberculoprotein intracutaneously, and all showed marked reactions. The above experiments would seem to indicate that the existence of hypersentitiveness to tuberculoprotein is not essential to infection. In experimental infection the development of the anaphylactic state appears to be conditional upon the parenteral introduction of tuberculoprotein coincidentally with infection. The evidence is against sensitization by the protein of harbored bacilli in tuberculous animals. There is no apparent relation between the tuberculin reaction and the anaphylactic state which may or may not exist in the experimentally infected animals. Old tuberculin is devoid of sensitizing properties.—*Sensitization Experiments with the Tubercle Bacillus and its Protein Extracts, M. I. Smith, J. Med. Res., August–October, 1922, xliii, 453.*

Nature of Tuberculin.—It is believed that there are two substances in tuberculin. One facilitates the ulceration and caseous degeneration of the lymph nodes and the other arrests the ulceration and nodule formation in the viscera, especially in the spleen. The one can be destroyed by digestion by pancreatin and the other can be extracted by alcohol.—*On the Influence of Tuberculin and Tubercle Bacillary Components on Experimental Tuberculosis, Korewo Yoshizawa, Jikken Igaku Zasshi, March, 1922, vi. no.* I, *Abstracted from Japan Medical World, July, 1922, ii, 202.*

Action of Tuberculin.—Selter's theory that tuberculin is an irritating (stimulating) substance which, through its action on tuberculous tissue is not changed, is not correct, because it contradicts the experiences obtained in the practical applications of tuberculin treatment. If one draws conclusions from facts of clinical experience, one is convinced that the tuberculin reaction is brought about by anaphylotoxic intermediate bodies or by anaphylactic reaction bodies, which manifest themselves when the reaction is incomplete or very slow.—*Über die Wirkungsweise des Tuberkulins, H. v. Hayek and L. Wieser, Ztschr. f. Tuberk., May, 1922. xxxvi, 288.*

Standardization of Tuberculin.—The government test of tuberculin is the Doenitz modification of the Koch procedure, utilizing the government tested tuberculin as a standard tuberculin. All tuberculins must equal the tuberculin standard, weaker preparations being discarded and stronger ones being accompanied by directions for their dilution. The original Koch method of testing consisted in killing a tuberculous guinea pig with 0.5 cc. of the preparation in question. Koch did not lay any significance

upon the strength by which the preparation exceeded this power but special animal studies made it seem desirable that this point be considered. For every test it is now required that a large series of guinea pigs (at least 50) be infected, and that the course of the disease be watched, and only such animals be utilized in which a steady loss of weight indicates that they are beyond the initial stages of the disease. When this is certain the test is made. Two parallel series are run with 6 animals. The first series receives subcutaneously increasing amounts of standard tuberculin, to determine the minimum lethal doses, and the second series the preparation to be tested. The preparations are diluted tenfold and 0.5 to 3 cc. are injected subcutaneously. Death of the guinea pig must occur within twenty-four hours, and section must reveal the findings characteristic of tuberculin action. Full-strength preparations are those in which the same amounts produced a lethal effect as with the standard. Naturally, exceptional findings for individual animals do not invalidate the results any more than they do in immune serum tests. If the preparation is above strength, it is returned with complete directions for dilution to equal the standard.—*Die staatliche Prüfung der Heilsera und des Tuberkulins. Mit einer Einleitung von W. Kolle, R. Otto and H. Hetsch, Arb. a. d. Staatsinst. f. exp. Therap. u. d. Georg. Speyer Hause, Frankfurt a. M., 1921, 13, pages 1–116, Abstracted from Centralbl. f. d. ges. Tuberk-Forsch., January, 1922, xvii, 69.*

Specificity of Tuberculin Reaction.—The analogy between the reaction to tuberculin and that of protein bodies is discussed, and a series of experiments undertaken to prove the specificity of the tuberculin reaction. Intracutaneous injection of O. T. and protein in the form of *caseosan* were given guinea pigs and tuberculous persons. The protein content of the subcutaneously injected material was determined beforehand. The tuberculin and *caseosan* used in the test contained 32.26 mgm. and 6.79 mgm. nitrogen, respectively. When the injected material contained equal amounts of protein substance, the reaction obtained with tuberculin was more pronounced with *caseosan*. In Koch's classical experiment, the guinea pigs injected with 0.3 to 0.5 cmm. of O. T. died very soon after the injection, while corresponding injections with the protein body did not injure the animals. *Caseosan*, injected in amounts in which the nitrogen content far exceeded that of O.T., did not produce the same reaction as O.T. When *caseosan* was injected in amounts of from 0.5 to 3 cmm., which corresponds to 100 to 160 mgm. O. T., it produced reactions similar to those of tuberculin, but there was never the same constancy of focal reaction. Therefore, one cannot ascribe to *caseosan* the same elective action as to tuberculin. The tuberculin reaction is probably only partly a protein reaction, therefore, the similiarity in action of the protein and the tuberculin; but tuberculin is far superior to *caseosan*, a typical protein, in that infinitely smaller doses of tuberculin are necessary to produce the same reactions. Blood analyses, performed on patients receiving the injections, speak for the specificity of tuberculin in contrast to that of a protein body.—*Die Specificität der Tuberkulin Reaction, E. Hagemann, Klin. Wchnschr., 1922, i, 2045.*

"Vital Tuberculin."—Selter came to the conclusion that it is futile to attempt to immunize guinea pigs with dead tubercle bacilli. He therefore attempted to use living bacilli of low virulence. For this purpose he prepared two products: (1) an emulsion in which the bacilli remained intact and (2) "vital tuberculin." These preparations exerted a marked protective action on guinea pigs. By injecting human tubercle bacilli into guinea pigs at seven-week intervals, Selter obtained the culture of tubercle bacilli of low virulence used. Selter also experimented upon himself and injected 10 mgm. of the emulsion subcutaneously. This seemed to have done him no serious harm for, apart from slight fever and a cold abscess which healed after a few weeks, he suffered no inconvenience. Tancré gives his experience with the two products upon 58 tuberculous patients. Of these, 8 received the emulsion and the remaining 50 were treated with "vital tuberculin." The former, while they seemingly bore well the subcutaneous injection of 0.0002 mgm., had severe reactions with very slight increases of this dose, the temperature rising to 39°C.; and in 6 of the 8 cases, after the injection of 0.1 mgm. a local abscess formed which healed after causing fistulae. The remaining 50 cases received "vital tuberculin." Of these, 46 were of pulmonary tuberculosis of all stages, 3 renal tuberculosis and 1 tuberculosis of the testicle. During the treatments all the patients were ambulant. The preparation was well borne by them. The same procedure was followed as with ordinary tuberculin, that is, in case a reaction supervened the treatment was interrupted for eight weeks and then the same dose was repeated. Altogether, 900 single injections were given. It is stated that no untoward results were observed.

No hemorrhages were noted nor any aggravation of the general condition. It is urged that the preparation deserves attention and a thorough trial. It is impossible as yet to state anything in regard to the therapeutic value of either the emulsion or the "vital tuberculin."—*Erfahrungen mit vital Tuberkulin, E. Tancré, Deutsch. med. Wchnschr., February 9, 1922, xlviii, 184.*

Moro's Diagnostic Tuberculin.—Moro, dissatisfied with the unreliability of O.T. for diagnostic purposes, introduced *D. T.* (diagnostic tuberculin), which consisted of a mixture of selected and concentrated stock cultures of human tubercle bacilli and bovine tuberculin. A review of the literature reveals an almost unanimous opinion that the *D. T.* is far superior to either bovo-tuberculin or O. T. In the author's clinic, before the introduction of *D. T.*, they had to make 120 intracutaneous tests (when the cutaneous reaction failed) on 689 patients (17 per cent), while after they began using *D. T.* they made only 26 out of 664 (4 per cent) intracutaneous injections.—*Bisherige Erfahrungen mit "Diagnostischem Tuberkulin," Maria Scharnke, Klin. Wchnschr., July, 1922, i, 1369.*

Value of Moro's Diagnostic Tuberculin.—Most investigators seem to find Moro's tuberculin superior to O.T. The author's experience leads him to opposite conclusions. Of 300 cases with 169 positive reactions, 8 per cent were positive with O.T. only, and only 5.3 per cent with *D.T.* There were 10.6 per cent stronger reactions with O.T. and 14.1 per cent with *D.T.* Lippmann and Röckermann also concur with the author's opinion as to the superiority of O.T. over *D.T.* Röckermann found that the reaction with concentrated *D.T.* is less pronounced than that with diluted *D.T.* The place of injection plays a great part in the results, in that the reaction on the proximal part of the arm is much stronger than on the distal end. The difference in the results obtained by various authors may be due to neglect of this factor. The author injects his patients on both forearms, with O.T. proximally and *D.T.* distally on one arm, and the reverse on the other arm.—*Über das diagnostische Tuberkulin nach Moro, Kretschmer, Klin. Wchnschr., 1922, i, 2087.*

Bovine Tuberculin in Diagnosis.—Bovine tuberculin alone does not permit a conclusion as to the type of tuberculous infection. However, bovine tuberculin has a more powerful action in cutaneous diagnosis than O.T. A mixture of two-thirds O.T. and one-third bovine tuberculin gave rise to no better reaction than one or the other tuberculins. Human *Cuti-tuberkulin* (Höchst) gave a stronger reaction than mixed or bovine tuberculin. Bovine tuberculin in its present form is considered unnecessary in cutaneous diagnosis.—*Ist das Perlsuchttuberkulin zur Kutandiagnostik erforderlich? H. Kleinschmidt, Beitr. z. Klin. d. Tuberk., March, 1922, l, 214.*

Partigen Studies.—An exposition and justification of the commercial significance and value of the partigen studies.—*Erläuterungen zur Partigenlehre, H. Much, Beitr. z. Klin. d. Tuberk., March, 1922, l, 138.*

Isolation of Tubercle Bacilli with Glycerine.—Glycerine has been found extremely useful as a means of isolating acid-fast bacilli from contaminated material. Tubercle bacilli in tissues preserved in pure glycerine remain alive for months, possibly years, in cold storage. Fifty per cent glycerine is not so efficacious and room temperature hastens the death of the bacillus. Ordinary bacteria are much more susceptible to glycerine, especially at room or incubator temperature. The method employed is as follows: A large platinum loopful of sputum or other material is inoculated into tubes containing 1 cc. of pure glycerine, 75 per cent, 50 per cent, and 25 per cent glycerine in normal saline solution. After remaining for twenty-four hours at room temperature, cultures are made on Dorset's 4 per cent glycerine-egg medium or on Petroff's medium. If contaminations are numerous on all tubes, further cultures are made on the third day, but this is not necessary when only one or two tubes are contaminated. Where there is much contamination, it may be necessary to revert to a third culture after a week; but the tubercle bacilli themselves do not appear to survive for longer than three to four weeks. To simplify the process, the addition of an equal volume of pure glycerine to the sputum, mixing and keeping at 20°C. until cultured, has been found useful. So far, by the use of glycerine, the author has not once failed to isolate, with extreme ease, the tubercle bacillus from any specimens in which the microscope has shown the bacilli to be fairly numerous.—*The Isolation and Preservation of Tubercle Bacilli by Means of Glycerine, C. C. Twort, Lancet, December 9, 1922, ccciii, 1221.*

Resistance of Tubercle Bacilli to Chemical Decolorization.—There is a certain relationship between pathogenicity for guinea pigs and acid-fastness. Especially clearly was this noted in experiments

in which passage strains were compared with the original cultures used. The difference was most marked when original strains were used which were of saprophytic nature and produced only local nodules after very large dose. Unmistakably there occurred a definite relation between the grade of acid and sodium sulphite resistance on the one hand and the time of residence of the strain under consideration in the warm-blooded host. The wax and fat content of various strains of acid-fast cultures did not reveal that the saprophytic strains contain less extractable fat or wax than genuine tubercle bacilli. It is, therefore, hardly to be considered that the waxy capsule of the tubercle bacilli accounts for its acid-fastness. The fat in the internal protoplasm, which is difficultly extractable, is associated with the characteristic staining property. The increased ability to retain the dye, as a result of animal passage, is due to a dispersion increase or surface tension increase of the colloidal parts of the cytoplasm. These changes are to be viewed as adaptation phenomena arising from external influences. —*Vergleichende Untersuchungen über die Resistenz der Tuberkelbacillen und verwandter Bakterien gegenüber entfärbenden chemischen Einflüssen, H. Schlossberger, Beitr. z. Klin. d. Tuberk., March, 1922, l, 141.*

Staining of Tubercle Bacilli.—Five methods of staining tubercle bacilli are compared and the relative merits of each discussed. Of these five (Ziehl-Neelsen, Spengler's, Jötten-Waarman's modification of Spengler's, Konrich's and Schulte-Jugge's modification of Konrich's) the Ziehl-Neelsen method consumes more time than any of the other four. While the microscopic field of a Ziehl-Neelsen preparation is more pleasing to the eye a Spengler preparation is more impressive and the intensely stained red bacilli stand out more prominently on a yellow background. The tubercle bacilli in the field show great variations in shape, thickness, length and arrangement. Most of them are as thin as fibrillae, some being as thick as anthrax bacilli, and Much's granules are present. Fifty-six sputa from clinically diagnosed pulmonary tuberculosis patients were examined, each by the five methods with the following findings: Spengler's method gave 25.2 bacilli in the average field, Jötten-Waarman's 23.7, Schulte-Jugge's 14.2, Konrich's 9.3 and Ziehl-Neelsen's 4.7. Ziehl-Neelsen preparations which showed very few bacilli were decolorized by hydrochloric acid-alcohol and restained by Spengler's method, with the result that far more and better stained bacilli appeared. Antiformin preparations gave the same results by all five methods. The Spengler method, in the light of the above studies, is advised as the one of choice. This method of staining as done by the author is as follows: Ordinary primary staining with carbol-fuchsin; pour off the carbol-fuchsin and cover with picric acid-alcohol (2–3 seconds); add 3 to 4 drops of nitric acid (5 seconds); pour off and cover with picric acid-alcohol, until the sputum particles are stained faintly yellow; wash in water; dry. The picric acid-alcohol is prepared as follows: 2 gm. of picric acid to 40 cc. of distilled water; allow to stand for twenty-four hours; filter; add an equal volume of 96 per cent alcohol.—*Die Tuberkelbacillenfärbung, F. Geschke, Zeitschr. f. Tuberk., July, 1922, xxxvi, 351.*

Technique for Staining Tubercle Bacilli in Sputum.—In staining tubercle bacilli care must be observed to stain the bacilli to a maximum, otherwise many of the bacilli will decolorize or may be overlooked on account of lack of intense stain. Counterstaining should not cause further decolorization. In the latter, light vesuvine and alcoholic or water solution of methylene blue are not well suited. The method of picric acid counterstaining (Kühne, Spengler) modified in 1920 by Jötten and Haarmann do not possess this disadvantage. The method has been simplified so that it can be performed as rapidly as the Ziehl-Neelsen method, as follows: 1. Two minutes' stain with carbolfuchsin (Ziehl-Neelsen) warmed to boiling point. 2. Decolorizing with 3 per cent hydrochloric acid-alcohol, alternated with water, until almost complete absence of red color. 3. Stain with saturated water solution of picric acid (1 per cent) one minute, with subsequent good rinsing in water. The results almost equal the concentration methods of Uhlenhuth-Hundeshagen (*Centralbl. f. Bakt., I., Orig., lxxxii, 1919*), namely, 96.5 to 98.5 per cent, while the Ziehl-Neelsen method gave only 81.5 per cent positive results.—*Zur Technik des Nachweises der Tuberkelbacillen im Sputum, W. Bender, Centralbl. f. Bakt., Orig., July, 1921, lxxxvi, 461.*

Comparison of Staining Methods for Tubercle Bacilli.—Five methods, the Ziehl-Neelsen, Gasis-Telemann, Kronberger, Unna-Pappenheim and Konrich, were used on 400 preparations. The Kronberger method was the least reliable, while the Konrich and Ziehl-Neelsen methods gave the best results. In the Konrich method the decolorizing with the sodium sulphite solution, besides saving alcohol had the

added advantage that even prolonged action did not decolorize the tubercle bacillus. A slight drawback exists, however, in that the solution loses its decolorizing power in a few days. The counterstaining with malachite green possesses the advantage that the green with the red does not fatigue the eyes. Individual bacilli are also more easily discernible by this method.—*Vergleichende Untersuchungen der von Ziehl-Neelsen, Gasis-Telemann, Kronberger, Unna-Pappenheim und Konrich angegebenen Färbemethoden zum Nachweis von Tuberkelbacillen, W. Bernblum, Centralbl. f. Bakt., Orig., September, 1921, lxxxvii, 23.*

New Stain for Tubercle Bacilli in Sputum.—The author's method for staining tubercle bacilli with cresol-fuchsin is described: The first staining solution is a mixture of 10 parts of crude cresol and 1 of saturated alcoholic fuchsin solution. The second solution is 10 parts of a 50 per cent alcoholic and saturated aqueous methylene blue solution. The usual staining manipulations are followed with these solutions.—*My Method of Demonstrating Tubercle Bacilli in the Sputum, Masuro Sugiyama, Chugkwai Iji Shimpo, Abstracted from Japan Medical World, June 15, 1922, ii, 170.*

Rapid Cultivation of Tubercle Bacilli in Urine by Petroff's Medium.—With the technique recommended by Petroff, for the detection of tubercle bacilli in the sputum, it was found that tubercle bacilli from urinary sediment were not so certain to form colonies as tubercle bacilli from sputum. A certain number of urines gave negative results, although tuberculosis of urinary organs undoubtedly existed. When the cultures are positive, the gain in time may amount to two or three weeks, a gain often important to the surgeon. The medium as used did not exclude the growth of other acid-fast bacteria.—*Milieu de Pétrof et diagnostic bactériologique rapide de la tuberculose des voies urinaires, Calmette and Limousin, Compt. Rend. Soc. d. Biol., May 6, 1922, lxxxvi, 935.*

Demonstration of Tubercle Bacilli in Feces.—Fifty grams of feces are triturated with a 25 per cent solution of sodium chloride to make a semiliquid emulsion. It is filtered through gauze and a 1 to 3 mixture of ligroin and sulphuric ether is added to it. Beneath the ether, a layer, 1 to 2 mm. in thickness, contains almost all of the bacilli, which may be fixed and stained in the usual way. By making use of this procedure it has always been possible to find bacilli in the stools of patients where tuberculosis was clinically evident by means of auscultation or radioscopy, although the germs were not present in the sputum. But where the tuberculosis was closed, even though acute, or where the tuberculosis was external the bacilli were never found in the stools. It is probable that these bacilli come into the feces through swallowed sputum and the method serves as a means of diagnosis for patients who do not expectorate. The fact demonstrates the necessity for disinfection of fecal matter.—*De la recherche des bacilles de Koch dans les selles, Venot and E. Moreau, Sociétés de Paris, Academie de Médecine, Section Études scientifique de l'Oeuvre de la Tuberculose, March 11, 1922, Presse Méd., April 1, 1922, xxx, 286.*

Extraction of Acid-Fast Bacteria with Ether-Acetone Mixtures.—Human and avian tubercle bacilli and a butter bacillus made virulent by guinea pig passage cannot be extracted to the point of losing their acid-fast properties by means of ether-acetone, which removes the acid-fast constituents of the saprophytic acid-fast bacilli. An acid-fast lipoid-like substance is, however, obtained by means of this extraction. The acid-fastness of these bacteria, therefore, does not depend entirely upon the presence of a soluble waxy capsule. It is believed that this property is dependent upon a dispersion of the fat-like bodies in the protoplasm and is associated with pathogenicity.—*Vergleichende Untersuchungen über die Extrahierbarkeit verschiedener säurefester Bakterien mit Äther-Acetongemischen, W. Pfannenstiel, Zeitschr. f. Hyg., January, 1922, xcv, 87.*

Tubercle Bacillus Concentration Method with Mastic.—The stock mastic solution is 10 per cent, in absolute or concentrated alcohol solution, which is filtered a few hours after standing and is stable. The solution is prepared by diluting 0.5 cc. of stock solution in 4.5 cc. absolute alcohol and blowing this into 20 cc. of distilled water. The milky, pink liquid keeps two to three weeks. Fifty cubic centimetres of sputum are rubbed up with three volumes of distilled water. This mixture in an Erlenmeyer flask is placed in a hot water bath and shaken vigorously until completely homogenized (about one-half hour); 8 cc. of this fluid is mixed with 2 cc. of mastic test solution and placed in a sedimenting glass for twenty-four hours in the incubator, and thereafter is centrifugated. Smears are then made from the various layers of sediment. The bacilli are found most easily and certainly in the lowest layers of the sediment. Smears stick to the slide without a fixative

throughout the process of staining and decolorizing.—*Ein neues Tuberkelbacillen-anreicherungsverfahren mit Mastixemulsion, R. Pfeiffer and W. Robitschek, Centralbl. f. Bakt., Orig., September, 1921, lxxxvii, 27.*

Demonstration of Tubercle Bacilli with Antiformin.—The antiformin method of Hundeshagen (*Centralbl. f. Bakt.*, 1919, xiii, 282) was tested and found very valuable. There is a definitely increased concentration of tubercle bacilli. The procedure is simple and gives results in a short time, but it can be recommended only where a large number of sputa are to be examined and where a number of centrifuges are available, since centrifugation requires at least fifteen minutes. A disadvantage of the method is that bloody sputa are unsuitable because they require high antiformin concentrations. —*Untersuchungen über die praktische Verwendbarkeit der Anreicherungsmethode mittels Antiformins zum Nachweis von Tuberkelbacillen im Sputum, G. Voigt, Centralbl. f. Bakt., Orig., October, 1920, lxxxv, 121.*

Wildbolz Test in Tuberculous Infants.—Acute progressive tuberculosis in 50 infants was studied, using the Wildbolz method, and positive results were obtained in all cases giving a positive Pirquet test. The author is inclined to accept Wildbolz's view as to the value of this test.—*Investigation on the Help of Diagnosis of Active Tuberculosis in Infants by the Use of Wildbolz's Urine Reaction, Takamoto Miyamura, Iji Shimbun, March, 1922, 1089, Abstracted from Japan Medical World, August, 1922, ii, 234.*

Wildbolz Reaction.—Of 12 cases where tuberculosis of the genitourinary organs and other internal organs was suspected, the auto-urine reaction was positive in 9. In one case active pulmonary tuberculosis was found. It is believed that the Wildbolz reaction has a definite place in the diagnosis of active tuberculous foci anywhere in the body. If the auto-urine reaction is negative and the cutaneous tuberculin reaction positive, then one can state definitely that there is no active tuberculosis.—*Beitrag zum Nachweis activer Tuberkulose durch die Wildbolz-Imhoffshe Intracutanreaktion, H. Heimberger, Med. Klin., 1922, xviii, 504.*

Urochromogen Reaction in Nontuberculous Conditions.—To determine the specificity of the urochromogen reaction of Weiss this test was made a part of the routine urinalysis in a general hospital. As cases of tuberculosis were received with relative infrequency and were rapidly transferred to more suitable institutions, it was not possible to study the reaction in connection with tuberculosis. Thus, to determine the incidence of positive reactions in conditions other than tuberculosis the test was made upon a series of 888 consecutive urines and an endeavor made to elicit any history suggesting tuberculosis. However, these histories were not always complete. In making these tests 5 cc. of fresh urine were diluted with 15 cc. of water, and one drop of 1:1000 aqueous solution of potassium permanganate added to one-half of this. The remainder served as a control. A positive reaction was encountered 16 times, an incidence of 1.8 per cent. From the history or clinical condition four of these positive cases were considered probably tuberculous. Hence, the incidence of positive reactions in other than tuberculosis, tuberculosis not being proved, falls to 1.3 per cent. It is concluded that the reaction does not occur promiscuously and that the occurrence of a positive reaction justifies an exhaustive search for a positive tuberculous focus.—*A Note Upon the Incidence of the Urochromogen Reaction of Weiss in a Series of 888 Examinations, R. A. Kilduffe, N. York M. J. and Med. Rec., November 1, 1922, cxvi, 523.*

Blood Picture in Tuberculosis.—Microscopic examinations of the blood of tuberculous patients revealed that, as has been generally thought, there is no specific change in the blood which differentiates tuberculosis from other diseases; but, by carrying out successive examinations, something can be learned about the prognosis in any special case. If there should be a decrease in the numerical percentage of polymorphonuclear leucocytes but an increase in the number of erythrocytes, as well as lymphocytes and eosinophiles, the case surely has a favorable prognosis, and vice versa. In the reverse case, the increase of the one and the decrease of the other three are always parallel. No cases are ever met with in cases in which both decrease and increase of the latter three occur simultaneously.—*On the Blood Features of the Tuberculous Cases. II. Part (concluded), Hidetarow Nagai, Nisshin Igaku, March, 1922, xi, no. 7, Abstracted from Japan Medical World, August, 1922, ii, 234.*

Blood Features in Pulmonary Tuberculosis.—Investigations of the blood changes in pulmonary tuberculosis during the various stages revealed that both the erythrocyte count and hemoglobin content

remain normal during the first and second stages, but decreased in the third, while the hemoglobin indices slightly decreased throughout the three stages. Leucocytosis developed during the third stage, due to an increased number of neutrophilic cells. The leucocytosis has, however, no connection with mixed infection. Lymphocytes decreased as the disease advanced. The percentage and the absolute number of large mononuclear leucocytes and the transitional mononuclear leucocytes are always constant. The percentage and the absolute number of the eosinophilic cells are physiological during the first and the second stages, but during the third they both show a certain decrease. Although the percentage and the absolute number of the basophilic cells appear to have a certain decreasing tendency, yet it is not very remarkable even in the third stage. The I form of neutrophylic leucocytes is smaller in number during the initial stage than in the second and the third stages, while the II, III, and IV forms are more numerous.—*On the Blood Features in Pulmonary Tuberculosis. Part I and II, Toshihisa Yokoyama, Kekkaku Zasshi, February and March, 1922, iv, nos. 2 and 3, Abstracted from Japan Medical World, September, 1922, ii, 261.*

Group Reaction with Blood Corpuscles to Determine Active Tuberculosis.—A new idea and study based on those by Wildbolz is given. The changes in the reaction curve, as occurs in the Wildbolz test with resulting change in salts of the urine, led the author to utilize the blood. By using 10 per cent peptone-bouillon the blood corpuscles are sufficiently protected. If blood is run from a vein into a flask with the bouillon, the corpuscles settle out, since the peptone-bouillon prevents clotting. The blood corpuscle sediment is now injected intracutaneously into the donor and into others, definitely tuberculous and definitely free from tuberculosis, in the arm. It is believed that conclusions can be drawn from these "group reactions." His conclusions are the result of 500 inoculations into 50 inoculation groups among predominantly surgical tuberculosis. It can occur that the auto-reaction may be negative and the control positive, but the auto-reaction is never positive with a negative reaction in the control.—*Über eine Gruppenreaktion mit Blutkörperchen zum Nachweis aktiver Tuberkulose, H. Kümmell, Zentralbl. f. Chir., December, 1921, xlviii, 1822.*

Differentiation of Acid-Fast Bacteria by Complement Fixation.—Pathogenic and saprophytic types of acid-fast bacteria could not be differentiated by the complement fixation reaction on the sera of immunized rabbits. Only one avian tubercle bacillus strain reacted in any way in a specific manner. The acid agglutination test also failed to prove specific and did not permit a differentiation of these bacteria.—*Über Versuche zur Differenzierung der sogenannten säurefesten Bakterien mittels Komplementbindung, H. Schlossberger and W. Pfannenstiel, Zeitschr. f. Hyg., January, 1922, xcv, 77.*

Complement Fixation Test in Tuberculosis.— Wassermann and tuberculosis complement fixation tests were done on the sera of 254 patients who consulted one of the authors for gastrointestinal disturbances and in whom tuberculosis was not suspected. In the tuberculosis tests two sets were run, one with the original technique and the other with the Hecht-Weinberg modification as slightly altered by the writers. This modification takes into account the amount of natural complement and amboceptor in the suspected serum and a set-up of twenty tubes was required. The serum is not heated. The antigens were Petroff's glycerine antigen, Miller's antigen, and Fleisher-Ives's antigen. One unit of complement, two units of amboceptor and one unit of antigen were used, together with a 5 per cent suspension of sheep cells. Slight fixations, as + and ++, were considered negative. *Results:* With the original technique there were 30 positive fixation tests and with the modification, 58. Petroff's antigen gave the greatest number of positives, and in no instance was there a positive reaction with the other two antigens and a negative one with Petroff's. It will be noted that the modified technique, using Petroff's antigen, gives nearly twice as many positives as the original technique, although the modification is not applicable where there is no natural amboceptor present in the blood. Cross fixation with syphilis was not observed. —*Further Studies in the Value of the Complement Fixation Test in Tuberculosis with Observations, Using the Hecht-Weinberg Modification. Second Paper, R. Upham and A. J. Blaivas, N. York M. J. and Med. Rec., January 3, 1923, cxvii, 22.*

Complement Fixation in Tuberculosis with Besredka's Antigen.—Experimentation in complement fixation was carried out along two lines, namely, for both antibody and antigen content of the serum. In 1913 Besredka found a new antigen which enabled him to demonstrate the presence of tuberculosis antibodies. Rieux and Bass obtained 19 per cent positive reactions in 200 non-

tuberculous persons. Jacquot, in 41 nontuberculous persons under his observation for from one-half to one year, obtained 4 positive reactions, which on subsequent examination became negative. Rist and Amieulle were able to eliminate tuberculosis as a diagnosis, by the complement fixation reaction, in cases of mediastinal tumor, bronchiectasis, pulmonary gangrene, syphilitic bronchiectasis and asthma. L. Rabinowitsch obtained only 2 positive reactions in 51 nontuberculous persons. Fried obtained, in 64 cases with a positive Wassermann, 32 per cent positives with Besredka's antigen. Bronfenbrenner modified Besredka antigen, so that syphilitic sera always gave a negative reaction, but the method is too elaborate for general use. Rieux obtained, in 17 cases of malaria with parasites in the blood, 7 positive reactions with Besredka's antigen. None of these 17 patients had either tuberculosis or syphilis. L. Rabinowitsch found that, if the Sachs-Seorgi reaction on the serum is positive after two hours' incubation at 37°C. but becomes negative later after eighteen hours at 37°C., this indicates tuberculosis. A negative complement fixation reaction in known tuberculosis is an unfavorable prognostic sign. In tuberculous meningitis in children the complement fixation is always negative. In experimental tuberculous animals the reaction always becomes negative in the last stages of the disease. Of 24 children with bronchial node tuberculosis, 11 gave a positive reaction. Sevi emphasized the fact that in children the complement fixation reaction by Besredka's method is far superior to the tuberculin reaction. In advanced age the tuberculin reaction is always positive, while the complement fixation reaction is only positive in cases with definite tuberculosis, according to the author's results in 100 cases between ages fifty and eighty-eight: 52 of these were tuberculous and 48 nontuberculous. With the exception of six patients, who gave a positive Wassermann reaction and a positive complement fixation with Besredka's antigen, all the rest of the nontuberculous cases gave a negative reaction for tuberculosis. The 52 tuberculous patients all reacted positively to Besredka's antigen. Mozer and Fried found, as a result of a study of 1000 cases, that the percentage of positive reaction with Besredka's antigen is greater the more the tendency of the tuberculous lesions to heal. Maissonet and Bass obtained 5 positive reactions in 7 definitely established cases of renal tuberculosis, while 4 cases with nontuberculous renal affections (pyelonephrosis, hydronephrosis) gave a negative reaction. Kruska and Pfenniger found, in 90 normal cows, 2.2 per cent positive reactions with Besredka's antigen, while 304 sera from tuberculous cows gave from 60 to 100 per cent positive reactions, varying with the stage of the disease. It is concluded that, despite the discrepancies and variations in findings of different investigators, complement fixation with Besredka's antigen is a valuable diagnostic and prognostic method in tuberculosis.—*Die Komplimentbildungsreaction bei Tuberkulose, G. Ichok, Zeitschr. f. Tuberk., October, 1922, xxxvii, 22.*

Serodiagnosis with Besredka's Antigen.—New tests confirm the previous announcement of a specific hemolysis obtained with unheated serum and Besredka's antigen. The reaction was negative in 60 nontuberculous subjects. In 24 syphilitics with a 4 plus Wassermann the reaction was one plus twice, 3 plus twice and negative seventeen times; that is, there were 16 per cent of positive reactions. The findings from hundreds of cases showed the reaction positive in 92 per cent of active and developing tuberculosis and positive in from 45 to 75 per cent of slow, inactive, pleural, lymph node and bone tuberculosis. A positive reaction indicates a lesion in evolution; it may even precede a flare up and become negative after its end. This reaction may reveal the tuberculous nature of occult maladies, such as rheumatism, febrile states, and erythema nodosum. It may be negative in patients near death, in very early cases and in discrete lesions. But the reaction is untrustworthy for prognosis, as it may be positive shortly before death. In cerebrospinal fluid with positive Wassermann, the reaction was never positive. It is suited to give frequent information concerning changes in a patient's condition, but it requires interpretation and its use should not lead to the neglect of ordinary methods of diagnosis.—*Le serodiagnostic de la tuberculose dans le sang et le liquide cephalorachidien avec l'antigène de Besredka, C. Massias, Compt. Rend. Soc. d. Biol., June 13, 1922, lxxxvi, 197.*

Agglutination Tests.—Employing Fornet's technique, sera from 74 tuberculous and 69 nontuberculous subjects were tested for agglutinins. The reaction was positive in 94.3 per cent of the tuberculous and in about 70 per cent of the nontuberculous sera. Of these nontuberculous sera, 49 had given negative fixation-reactions with Besredka's antigen, a result which, if correct, makes the reaction of slight diagnostic value. The percentage for tuberculous sera agrees approximately with Fornet's findings, but the positive results with nontuberculous sera are far in excess of Fornet's figures.

Agglutination occurred in all cases of healed tuberculosis, a fact observed by Fornet and others. In another series of tests made with Courmont's emulsion, it was not found possible to follow his directions exactly; the results obtained differed considerably from Courmont's own findings.—*Rapports entre la reaction de fixation et celle d' agglutination dans la tuberculose, Marguerite Aitoff, Compt. Rend. Soc. d. Biol., May 27, 1922, lxxxvi, 1125.*

Tuberculosis Antibodies.—The recent preparation of more sensitive antigens has caused a revival of interest in complement fixation in tuberculosis among French physicians. All workers agree that the reaction is specific; the question is as to its clinical application. The present report is on one year's work with this test in the tuberculosis division of the Hospital of Ivry, near Paris. It was applied at first to all patients; later, a certain number was selected in whom the reaction was done periodically in order to determine any changes in the complement-deviating power of the sera. All types of cases were tried: favorable, stationary, fatally progressive, and also a few nonpulmonary. The cases numbered well over 200, and in almost all of them two or more tests were made at intervals of about three months. The methyl alcohol antigen of Nègre and Bocquet was used and the number of units of complement deviated was determined in all cases. In 24 patients without a single sign of active tuberculosis, 14, or more than 50 per cent, gave positive reactions. These cases were all followed for more than one year and never showed a manifestation of active tuberculosis. At the same time it should be noted that certain of them were physicians, nurses and students in contact with tuberculous cases; also that some gave negative reactions at times. Certain individuals, who previously had had active tuberculosis but were thoroughly arrested for years, showed a persistence of positive reactions. The proportion of positives is high in ulcero-caseous types, all but 12 of 147 cases. The negative result, too, is not of diagnostic significance, since a certain number of cases showed it even with positive sputum and cavity formation. At the same time, the negative result is not necessarily constant, and a series of tests is really necessary for a proper conclusion as to the presence of tuberculosis antibodies. The complement fixation test then is not to be regarded as either a positive or negative element in the diagnosis. Nor is it of value in prognosis, since the antibody is found to vary considerably, up and down and vice versa, regardless of whether the patient is improving or retrogressing. At the same time, in a single individual there can be gross clinical changes without any particular alteration in antibody-content. However, although no great value is to be attributed to the test diagnostically or prognostically, it should, nevertheless, be employed to complete an examination of the tuberculosis case, because in cavity cases, as a general rule, the antibody content is notably high, and in fibrous cases it is strikingly high, much higher than in any other type. Antemortem results were not seldom different from those usually reported, since in some cases the antibody-content was found high even on the eve of death. Only about 50 per cent of cases of tuberculous peritonitis and cervical adenitis show a positive reaction. With artificial pneumothorax the antibody-content falls after compression of the lung: a subsequent rise is due to focal activity in the other lung. The authors agree with Calmette that the antibodies are evidence of cellular reaction against the toxic products excreted by the bacilli in the tissues, and not one of the essential elements in the defense on the part of the body against infection by the tubercle bacillus.—*Contribution à l'étude des anticorps tuberculeux, P. Armand-Delille, P. Hillemand and C. Lestocquoy, Ann. de méd., October, 1922, xii, 313.*

Flagella of Bacterium Pseudotuberculosis Rodentium.—The flagella were studied in 7 strains of *Bact. pseudotuberculosis rodentium.* In 3 there were flagella, while in the others only suggestions of these were seen. The bacteria carry an extrapolar, interpolar and equatorial flagella, agreeing with representatives of the hemorrhagic septicemia group.—*Zur Morphologie des Bact. pseudotuberculosis rodentium (Preisz), L. et N. St. Plasaj, Centralbl. f. Bakt., Orig., July, 1921, lxxxvi, 468.*

Differential Diagnosis of Pulmonary Tuberculosis.—The necessities of war emphasized the importance of rapid, well-founded, uncompromising decision in matters of tuberculosis diagnosis. In the early days of the war medical officers were not well prepared to meet this new fact and many false diagnoses were made. The fact that there was a considerable number of cases labeled at first tuberculosis and ultimately shown to be incorrectly diagnosed was a surprise to the majority of tuberculosis experts. A positive skin reaction to tuberculin cannot be considered as a diagnostic sign of tuberculous disease, but only as an index of tuberculous infection. We are

now led to believe that persons reacting positively to the Pirquet test are more protected against subsequent attacks of tuberculosis than persons showing no reaction. Percussion and auscultation have their limitations and pitfalls and in many cases the X-rays are able to lead to correct diagnosis. The discovery of deep-seated lesions, early cavitation and consolidation, greater in extent than the stethoscope shows, has been due to the X-ray. To interpret correctly the sequence of events in the evolution of lung tuberculosis we must take into account the valuable information which the X-ray exploration of healthy and diseased chests yields. At the same time it is a great aid in the diagnosis of nontuberculous chest disease. Examination of the sputum is of paramount importance. An open lung lesion where no tubercle bacilli can be found raises the question of a nontuberculous infection, especially when repeated sputum examinations are negative for acid-fast bacteria. There is no real frontier between the province of the nose and throat specialist and the tuberculosis expert. The more one studies bronchial and lung disease the more convinced he becomes of the interdependence of all parts of the respiratory tract. Of 192 men sent to the tuberculosis clearing station at Compiègne, of which Rist was in charge, with a diagnosis of tuberculosis, only 27.5 per cent were found in which the diagnosis was justified. This includes arrested, healed and active cases, 139 being definitely nontuberculous. At the Laennec Hospital of which he was also in charge, it was found that of 382 men sent in for tuberculosis only 10.8 per cent had lung tuberculosis; 238 cases were nontuberculous. During the winter of 1919–1920 medical officers referred to him 119 men for pensions on the ground of lung tuberculosis. The diagnosis was confirmed in 47 per cent of the cases. The rest were nontuberculous. Sergent found the condition in 31 per cent of 1719 men alleged to have tuberculosis to be incorrectly diagnosed. In the report of the public health committee of the London County Council for 1921 is the result of observation of 158 ex-service and insured London cases, sent for diagnostic purposes to the Brompton and City of London chest Hospitals. Of these, 78.4 per cent were nontuberculous; of the 34 tuberculous cases only 24 needed treatment; the other 10 were arrested. These figures could be repeated for other countries. A large number of nontuberculous cases have consequently been treated for years as though they were suffering from tuberculosis. They have expended a great deal of money, undergone hardships and have not reached the proper treatment which the real disease, from which they suffer, requires. Many diseases are mistaken for pulmonary tuberculosis. Chief among these are: 1. Syphilis, without tubercle bacilli in the sputum and with a positive Wassermann. 2. Echinococcus of the lung. 3. Cancer: this is not so exceptional. One must not rely upon the finding of tumor cells in the sputum, nor upon their demonstration in the pleural effusions which frequently complicate the new growth. Only a careful X-ray examination and absence of tubercle bacilli from the sputum can lead to an accurate diagnosis. 4. Bronchiectasis. The sputum is frequently not offensive, but there are often alternating periods of profuse and scanty expectoration and sudden and profuse hemoptysis. The cavities may be distributed in any part of the lung with equal frequency. But, most important, the sputum contains no tubercle bacilli. The anamnesis frequently helps greatly in diagnosis. 5. Purulent nontuberculous pleurisy either of an interlobar fissure or encysted in some part of the pleural cavity gives focal signs and general symptoms such as fever and wasting; when ruptured into a bronchus it gives rise to purulent expectoration, and incorrect diagnoses are made. Many morbid conditions of the upper respiratory tract will, if not completely studied, lead to a diagnosis of tuberculosis. When attention is drawn to the connection between infections of the upper respiratory organs and chronic cough with occasional signs of localized or disseminated bronchitis, it is quite surprising how often the curetting of an antrum, the withdrawal of a hypertrophied turbinate bone, or the removal of adenoids or of hypertrophied tonsils puts an end to a long story of apical catarrh or of suspicious bronchitis or of incipient tuberculosis. Over 50 per cent of the cases from clearing stations which were reported as nontuberculous come in this class. These results have also been confirmed by Sergent in France and Webb in the United States. The reasons for these mistakes may be put down to two causes: 1. The clinician has been so impressed with the idea of early diagnosis that he has developed a tuberculosis complex and sees the disease in everything. 2. Too great importance has been attached to symptoms versus signs as a positive basis for a diagnosis of tuberculosis. There is not a single symptom, or group of symptoms, which tuberculosis does not have in common with other diseases. The physician should not ask himself whether the patient has tuberculosis, but simply consider whether there is in the lung or elsewhere a localized lesion that may account for the symptoms

observed. Above all, the sputum examination must be used implicitly. Repeated negative examinations do not contraindicate a diagnosis of tuberculosis, but should put one on his guard, especially so since negative findings are very frequent in early cases of real tuberculosis.—*Discussion on the Clinical Differentiation of Pulmonary Tuberculosis from Other Respiratory Affections, E. Rist, Brit. M. J., October 21, 1922, 733.*

Differential Diagnosis of Large Cavities and Pneumothorax.—A case with an extremely large cavity is reported in which the differential diagnosis of pneumothorax (closed or open) came into consideration. The following measures for diagnosis were considered: thoracic puncture and connection with a manometer of a pneumothorax apparatus, injection of methylene blue solution, and aspiration of the secretion (exudate) in the space. While formerly the diagnosis in many cases could not be established during life, it can now be definitely done. This is important for therapy. The thoracoplastic operation of Sauerbruch is the choice with a large cavity. If there is closed pneumothorax, dry or with exudate, the ordinary treatment, as in artificial pneumothorax, is to be followed. In an open pneumothorax the aim should be to close the fistula as soon as possible and then to proceed as in closed pneumothorax.—*Die Differentialdiagnose zwischen extremgrossen Kavernen und Pneumothorax und ihre Bedeutung für die Therapie, G. Michels, Beitr. z. Klin. d. Tuberk., March, 1922, l, 232.*

Criticism of Physical Examination of Lungs.—The diagnosis and prognosis of pulmonary tuberculosis are in need of improvement; 23 per cent of a large material did not have pulmonary tuberculosis and 46 per cent were of questionable prognosis. Of the advanced cases a larger number should have been sent to the sanatorium earlier. Some wrong diagnoses are to be attributed to the failure of the medical profession. The physical methods of investigation (percussion and auscultation) are not properly interpreted. Various misinterpretations are pointed out. Cavity symptoms, especially, are mistaken. The common signs (amphoric breathing, Wintrich's and Gerhardt's signs) are rarely observed. Even the roentgenological filling of cavities with secretions is rarely seen. The author evaluates various cavity sounds. Specific diagnosis is rejected. Careful attention must always be paid to the shortcomings of the technique of physical diagnosis and its sources of error. A complete knowledge of the pathological relationships is valuable.—*Kritik der physikalischen Untersuchungen der Lungen, H. Ulrici, Beitr. z. Klin. d. Tuberk., March, 1922, l, 221*

Determination of Pleuritic Adhesions.—Symptoms of pleuritic adhesions can be subjective or objective. Localized pain and uncomfortable feeling during respiration, if attributable to the internal organs, are subjective signs. For recognizing the objective symptoms, inspection, palpation, percussion, the roentgen ray and electric current can be utilized and of recent interest the graphic method. Riegel and Tuczek found the apical cardiac impulse increased during inspiration. Diaphragmatic adhesions reveal Litten's sign and associated with this Williams's sign. Panyrek found capillary dilatations associated with localized pain in the vicinity of adhesions. Salzer as early as 1866 noted that pleural adhesions resulted in a certain grade of lung displacement. The X-ray gives mainly information on adhesions to the diaphragm, but practically none on adhesions in the upper parts of the lungs. Hungarian authors report on the use of electric stimulation of the phrenic nerve for determining diaphragmatic movement. In the presence of adhesions there may be an increase in residual air and a diminution in the vital capacity. Deist has utilized graphic methods especially in instituting artificial pneumothorax to determine the presence of adhesions. By analogy to the effect of pericardial adhesions upon the systolic traction on the chest wall, he reasoned that with pleural adhesions there should be an effect during respiration upon the intercostal spaces which, if not visible to the naked eye, could be determined graphically. The method for obtaining the curve is to use small funnels, about 2 cm. in diameter, which are connected by rubber tubing with a Jaquet cardiosphygmograph, and are then sealed to the intercostal space by means of a rubber belt, into which several of these are attached at different locations or in different interspaces. Twenty-one pneumothorax cases were tested by this method and 19 times the findings agreed with the roentgen findings. By means of the graphic method the presence of adhesions can be determined and, when adhesions are present but cause no obliteration, the free pleural space can be thus found when instituting a pneumothorax (naturally only partial). Adhesions can be considered present only when there is a definite constant change in normal curve not influenced by the various types of respiration. In the upper intercostal spaces normal curves can obtain in the presence of adhesions, but from the fourth

interspace down the adhesions produce definite effects upon the curve. Typical curves are given as illustrations.—*Ergebnisse der Untersuchungen zur Feststellung pleuritscher Adhäsionen am Lebenden, H. Deist, Centralbl. f. d. ges. Tuberk.-Forsch., April, 1921, xv, 133.*

Importance of Diagnosis of Pulmonary Tuberculosis of Aged.—Pulmonary tuberculosis in advanced age is not rare and can appear in various forms. The so called bronchitic and emphysematous forms are the most frequent. The course is slow and the clinical symptoms are not outspoken. Careful and repeated examination of the sputum makes it possible to attain a diagnosis. Lung affections in old people should be carefully studied, since statistics show that the frequency of pulmonary tuberculosis at this time of life is equal to that in the earlier periods.—*La tuberculose pulmonaire sénile. Importance de son diagnostic dans la lutte antituberculeuse, Labesse, Thèsis Paris, 1920, Abstract from Zentralbl. f. d. ges Tuberk-Forsch., January, 1922, xvi, 549.*

X-ray Changes in Tuberculous Lung Lesions.—In the typical mottling or cirrose clouding seen in the X-ray picture of pulmonary tuberculosis, the centre of each area of abnormal density is its heaviest part while the periphery is hazy and indefinite, shading out into normal lung markings. The collateral haze represents inflammatory reaction that is typically seen about tubercles arising in allergic tissues. Accompanying such shadows the hilum is usually seen to be indistinct in outline, and accentuated trunks converge toward this structure. It is unsafe to diagnose activity from a single set of pictures; an actual increase in the lesion, shown in serial pictures, is the only sure X-ray criterion of activity. The X-ray changes in the advancing, caseating and ulcerating lesion are described. When repair becomes established the first notable change is clearing of mottling, which results in a disappearance of the perifocal haziness and leaves behind more or less discrete, sharply outlined densities, representing conglomerate tubercles in the stage of retrogression; usually the patient shows coincident symptomatic improvement. Within two to six months, if repair continues, deposits of fibrosis can be traced by roentgenographs; these deposits increase in density and contract in size during the next year or two until all mottling becomes replaced by discrete uneven clouding. The contraction of diseased areas following the development of massive fibrosis may be quite striking and may result in the complete obliteration of cavities. Symptoms usually decrease in proportion, but where cavity remains patent regardless of enveloping fibrosis, the patient usually has persistent expectoration containing tubercle bacilli, and he is more liable to have hemoptyses and complications. Calcification has not been observed as playing a very important rôle in the healing of adult pulmonary tuberculosis. In cases of relapsed disease the X-ray usually shows the new mottling and, in some instances, a breaking down of old fibrous tissues. Inhibition of the diaphragm is often an accompaniment of active pulmonary disease. Pleural annular shadows are seen fairly commonly and apparently represent localized pleurisies, with or without separation of the pleural layers; in cases of pleural separation a horizontal fluid level may be seen. These shadows appear as accompaniments of active intrapulmonary disease and disappear as the disease becomes quiescent. The X-ray pictures of changing tuberculous lesions are indispensable supplements of other clinical and laboratory observations. Close coöperation between clinician and roentgenologist is therefore imperative. Reproductions of chest X-ray pictures are included.—*Serial Roentgenographic Observations of Chronic Pulmonary Tuberculosis, J. B. Amberson, Jr., Am. J. Roentgenol., October, 1922, ix, 639.*

X-Ray Shadows in Region of Hilum.—It was hoped to make it possible to differentiate the various shadows about the hilum. Successive and separate injections were made, in cadavers, of all blood vessels at the base of the heart, the pulmonary veins, and all branches visible on the screen. Radiographs were made, and these were compared with films taken from normal living subjects and from patients with tracheobronchial adenopathy. These experiments may make it possible to avoid certain errors of interpretation.—*Les ombres hilaires normales et pathologiques, Duhem and Chaperon, II Congres de l'Association des Pediatres de Langue Francaise, Paris, July 10–12, 1922, Reported in Presse Méd., July 29, 1922, xxx, 647.*

X-ray Diagnosis of Pulmonary Tuberculosis.—X-ray observations concern not merely one spot of density but rather the entire lung fields, the level of the diaphragm, the excursions during respiration and the position and movements of the heart. Doubtful cases, especially of early pulmonary tuberculosis, may require repeated examinations. The X-ray examination as an accessory to and combined with the clinical

examination enables one to make an earlier diagnosis in many doubtful cases of disease of the chest with an accuracy not obtained heretofore and no medical examination can be considered as completed which has neglected this method.—*The X-ray in the Diagnosis of Pulmonary Tuberculosis, S. W. Ellsworth, Boston M. & S. J., September 28, 1922, clxxxvii, 472.*

Use and Abuse of Radiology.—When properly understood the claims of radiology are modest, but in the past it has had greatness thrust upon it by those practitioners who credit the radiologist with almost magic powers. To-day there is no need to insist on the benefit of coöperation with the medical and surgical staff. It must be impressed upon the practitioner that radiology is a consultation measure and that the consultant is entitled to full notes on any case. Lack of essential details of the case may lead to improper technique or failure to observe certain fleeting phenomena. The comparison of normal and abnormal is facilitated by having the attention drawn to certain queries. The radiologist may supply either facts, inferences or both. The final verdict lies with the practitioner, who must not neglect his part in collecting data. The radiologist should render his report in two parts: (1) the facts observed and (2) the inference he draws from them. *Diagnosis of form* (positive and negative facts): It is a peculiar feature of X-ray diagnosis that surgical facts are more easily demonstrated by this means than are medical facts. However, in every situation, the X-rays can give positive information, and the region of the chest is no exception. We can diagnose the presence of pleurisy with effusion and dry pleurisy and can judge with ease the extent of the process and see the degree of displacement of the heart. Empyema, abscess of the lung, pneumothorax and pericarditis are all easily distinguishable, also early aneurism. *Inferences:* There are some cases where, in spite of the accessibility of the region, the results can only supplement an accurately conducted physical examination. Broadly speaking, the practice of drawing conclusions as to the etiology of shadows in the lung is a dangerous one, and in no disease is this brought home to us with greater force than in phthisis. In this disease a radiological examination is less helpful in deciding that the disease exists than in giving us a valuable picture of its extent. The X-ray will not differentiate with certainty between active and nonactive disease, nor between the shadows cast by miliary tubercle and miliary carcinoma. A pleural effusion may mask an underlying malignant growth. In occasional suspected cases of tuberculosis the X-ray may be the deciding factor. Repeated examinations are most valuable in watching the progress of a case once diagnosed. *Diagnosis of function:* This is required particularly in the case of the gastrointestinal tract, where positive facts are few. In constipation, we can distinguish between the two forms, a matter of importance frequently ignored. *Conclusion:* The following advantages accrue from X-ray evidence: (1) confirmation of a diagnosis, (2) determination of the extent of a disease, (3) an aid in prognosis by serial examinations, (4) an aid in differential diagnosis, and (5) correction of an erroneous diagnosis. Consultation and full data are indispensable for an understanding of the results of the examination.—*Radiology, Its Use and Abuse, R. A. Morrell, Lancet, October 7, 1922, cciii, 748.*

Diagnosis of Pseudotuberculosis.—The diagnosis of pseudotuberculosis in the guinea pig, by testing the serum for agglutinins, is not possible in all cases, since the sodium chloride, as also the normal control serum, can show a flocculation. The complement fixation reaction with homologous antigen, as well as with mixed extracts, permits the determination of pseudotuberculosis in guinea pigs eight days after infection. The intracutaneous method establighes a diagnosis where infection occurred six to twelve weeks before, while the more recent infections react only to larger doses. The method is simple and certain.—*Zur Diagnostik der Pseudotuberkulose, W. Bachmann, Centralbl. f. Bakt. u. Parasitenk., Abt. I., Orig., November, 1921, lxxxvii, 171.*

Tuberculous Ophthalmia Secondary to Tuberculous Tonsil.—Tuberculous ophthalmia has been recognized for some time and usually treated with tuberculin; but unless there was a pulmonary lesion a further search for a primary focus has usually not been made. In the case reported, the patient, aged twenty-one, had been operated on at the age of three for tuberculous cervical adenitis, and a tonsil operation was done at the age of fourteen after repeated attacks of tonsillitis. At eighteen she first began to have inflammation of the right eye, diagnosed as tuberculous ophthalmia. She received several courses of tuberculin, but the trouble recurred and became worse until there developed marked conjunctivitis of the right eye, a diffuse opacity of the cornea, scleritis and uveitis, and conjunctivitis and ciliary injection of the left eye. Examination finally revealed remaining stumps of the

tonsils on both sides which were removed and found to be tuberculous. At the time of operation the vision was so impaired that the patient could not recognize her mother in the same room. Nine months after the operation the vision in the right had returned to 20/50, and in the left to 20/20. The opacities in the right eye cleared beyond all expectation; the left eye is perfect. No similar case could be found reported in the literature.—*Focal Infection in the Tonsil Causing a Tuberculous Ophthalmia, C. M. Jack, J. Am. M. Ass., November 4, 1922, lxxix, 1576.*

Tuberculous Gingivitis Treated by Radium.—The lesions first appeared as small punctate areas scattered over the gum margins of the upper and lower canines and incisors and the left lower molars of both labial and lingual surfaces. These soon blended, forming irregular serpigenous lines, extending well down over the surface of the gums and over a great area of the left cheek. The ulceration became progressively definite and invading, remaining always fairly superficial with sharp red irregular borders, within which were interspersed soft granulations, with pinhead spots of yellow and grey and occasionally covered with cloudy films of dirty yellow serum. There were much irritation and frequent pain. The case, having resisted other forms of therapy, was treated with radium. After each treatment the lesions grew paler, with less pain, until finally all signs of ulceration, irritation and pain had disappeared To date there has been no evidence or sign of recurrence.—*A Case of Tuberculous Gingivitis Treated with Apparent Success by Radium, G. F. Pfahler and B. P. Widman, Amer. J. Roentgenol., November, 1922, ix, 756.*

The Teeth and Tuberculosis.—Examination of 228 inmates of 2 sanatoria in Schömberg revealed: 1. The so called Frederick Thomson gum margin finding cannot be considered as an early symptom of tuberculosis, since it is seen with healthy teeth. 2. Tuberculous patients do not have, as an average, worse teeth than other people in the same vicinity. If a greater incidence of caries is noted in some cases, the same causes are instrumental as lead to the tuberculous disposition, namely, heredity, disease, vocation, etc. 3. During the course of the disease incidence of caries increases in the more severe cases, but within narrow limits and occasioned by harmful influences affecting the teeth externally. A withdrawal of calcium salts is not to be considered, and the claim that an increased incidence of caries is a specific result of tuberculosis cannot be considered as correct.—*Tuberkulose und Zähne. Führt die Tuberkulose in ihrem Verlauf zu einer vermehrten Caries-frequens, E. Kiehnle, Diss. Erlangen, 1921, Abstract from Centralbl. f. d. ges. Tuberk.-Forsch., March, 1922, xvii, 302.*

Experimental Tuberculous Infection of Tonsils.—An attempt was made to determine the incidence of primary tuberculous infection of the tonsils, which might be expected to occur more frequently. The rabbit was used as experimental animal, because the tonsils of this animal so closely resembled the human tonsils in their anatomical position and histological structure. The author permitted rabbits to inhale powdered carmine and tubercle bacilli, and studied the fate of inhaled materials microscopically. It was found that these materials rarely infected the tonsils for the following reason: (1) the tonsils are not in close relation to the trachea; (2) the materials are mostly detained by the mucous membranes of the pharyngeal wall in close vicinity to the tonsils; and (3) most of the inhaled materials are taken up by active leucocytes, which lie in the tonsillar fossa, and are carried away by these phagocytes. Other factors which serve to make infection difficult are the easy detaching of the epithelium of the rabbit's tonsils under purely physiological conditions. In fifteen minutes after the introduction of powdered carmine into the tonsils, there occurs an increase in the leucocytes in these glands. The materials which find their way into the tonsils have either entered through the tissue crevices or have been carried into them by the phagocytes, and sometimes by the lymphatic circulation. There is a difference between the epithelium of the tonsils of adult persons and that of young persons, in that the former possess more compact flat cells.—*An Experimental Study on the Explanation of the Reason Why There Are Met with Few Cases of Primary Tuberculous Infection of the Tonsils, Makoto Kodama, Keio Igaku, March, 1922, ii, no. 3, Abstracted from Japan Medical World, August, 1922, ii, 235.*

Diagnosis of Tuberculous Cervical Lymph Nodes by X-Rays.—In some cases of tuberculosis of the cervical lymph nodes the X-ray has served to differentiate it from Hodgkin's disease, lymphosarcoma, chronic lymphadenitis, carcinoma and cysts. This depends on the fact that calcification in tuberculous cervical nodes does exist more frequently than is generally taught. To demonstrate this point, X-ray plates of the

neck of 40 unselected cases of unquestionable tuberculous cervical adenitis were made. The ages of these ranged from 6 to 42. Twenty-one or 52.5 per cent showed definite areas of increased density, corresponding in location to the lesion found on physical examination. These areas are almost of the density of bone and vary in size from a bird-shot to an almond; they may be single or multiple, and in two plates the appearance was that of an area of fine sand. Of the 21 patients with positive plates, 10 were proved tuberculous by microscopic examination of excised tissue. Of the remaining cases, 4 showed very large discrete densities in the plate, 3 showed pulmonary involvement and 4 presented cold abscesses with resulting sinuses. Tuberculosis of the cervical nodes is notorious for its necrosis and, as calcification goes with necrosis, the natural deduction is that the areas of increased density seen in the plate are due to lime salts. Only a few plates were obtained of non-tuberculous lesions. None showed evidence of calcification. A study of the literature indicates that no other condition has been shown to present calcification or similar densities by the X-ray, with the exception of adenomatous goitre, dermoid cysts and perhaps calcification of an artery in arteriosclerosis. The technique is simple. A small plate that fits between the occiput and the second dorsal vertebra and snugly against the back of the neck is more likely to pick up the smaller shadows than a larger plate. One anteroposterior view is usually sufficient, as lateral views are largely obscured by vertebrae, mandible, hyoid bone and thyroid cartilage.—*The Roentgen Ray Diagnosis of Tuberculous Cervical Lymph Glands, J. M. Hanford, Amer. J. M. Sci., October, 1922, clxiv, 539.*

Characteristics and Treatment of Tuberculous Cervical Lymphadenitis.—An experience with 2,000 cases of lymph node tuberculosis indicates that there is a place for conservative as well as for radical treatment. It is important first to decide whether the infection has been hematogenous or lymphogenous from a local focus of infection; this may be determined clinically and pathologically. A scattered, haphazard, and often coincident appearance of multiple diseased nodes in areas unconnected by lymphatic vessels suggests a blood infection, while the local development of a tuberculous node, the disease remaining for a time localized to that node or its immediate neighborhood and afterward spreading to actually adjacent nodes, suggests a lymphatic infection, especially if the affected nodes lie in lymphatic connection with such an obvious area of absorption as the tonsil. Pathologically, in a node sectioned longitudinally, in the case of blood infection the early disease is central, while in the lymphatic spread the disease is distributed as groups of follicles around the periphery close beneath the capsule in what may be termed the "corridor of the gland." Over 90 per cent of the infections are lymphatic. The approximate distribution of occurrence of the lymphatic variety is given in the following table.

FOCUS OF ABSORPTION	GLANDS AFFECTED	PERCENTAGE PROPORTION
Faucial tonsil	Jugulo-digastric group	80
Nasopharyngeal adenoids	Postcarotid group	12
Carious teeth	Submaxillary group	8

In the small percentage of cases where the cervical disease is first noticed in the supraclavicular region, the extension is usually from the mediastinal or bronchial nodes. It is emphasized that in many cases cervical node tuberculosis is a local manifestation of a local absorption, as from the tonsils, and the adenitis remains for a time the only manifestation of the disease, apart from such infection as may exist in the area when the absorption occurs or in the lymphatics which conducted the disease. In certain types of tuberculosis the prominent lesions are but local manifestation of a systemic disease, but in the cervical adenitis of children the disease usually remains for a considerable period unaccompanied by a general infection. In the early stages the infection is purely tuberculous but, later, secondary infection may supervene because of unwise operative interference or periodic attacks of subacute lymphadenitis and periadenitis. There are three pathological types of tuberculous lymphadenitis, namely, the caseating, the lymphoid, and the fibrous. In the first type caseation follows an intraglandular tuberculosis, and eventually a periadenitis usually develops, presumably because of a secondary pyogenic infection. Following this, a periglandular tuberculous abscess appears, which may lead to the later stages of subcutaneous abscesses, and, finally, a sinus or tuberculous ulcer of the overlying skin or mucous membrane. The lymphatic type is comparatively uncommon and may be mistaken for Hodgkin's disease;

there is little tendency to caseation or periadenitis and the nodes remain discrete. The fibrous type is least common in children although frequent in adults; the nodes are usually small and hard with central caseation and surrounding adhesions. In Edinburgh cervical lymphadenitis is more common than in other centres, probably because of milk infection. The caseating type is quite frequently seen which may be accounted for by the possibility that the bovine infection runs a more acute course in lymph nodes than the human. In children under one year the disease makes rapid progress and there is an early hematogenous dissemination. With each successive year of life up to the time of puberty there is a gradually increasing resistance to the disease. Constitutional symptoms of toxemia vary in different children. Tuberculous lymphadenitis of the lymphatic type is preventable by the sterilization of all milk that the child consumes up to the age of five or six years, and by avoiding contact with cases of open human tuberculosis. It is doubtful whether tuberculosis can be completely eradicated from lymph nodes by conservative measures of treatment; often an apparent cure is really only a stage of latency. This is proved by the fact that the disease was more common during the later period of the war and the succeeding months, when infection was no greater but resistance was diminished by dietary deprivations; also by the frequent development of the disease following an acute exanthem and the finding of live tubercle bacilli in excised nodes after a period of conservative treatment. In view of the fact that we possess no specific antibacterial agent to overcome the tubercle bacillus, the wisest course is to remove completely the affected node or group of nodes before the disastrous complication of blood invasion occurs. Incision and scraping of the nodes is condemned; it does not pretend to eradicate the disease; it increases the risk of dissemination by destroying limiting barriers, and sooner or later it ends in a secondary infection gaining entrance to the wound. Probably 80 per cent or more of the cases call for removal of the jugulo-digastric group, and as this group is in close lymphatic connection with the posterior carotid chain the operation is not complete unless this group too is removed. The author has operated to remove cervical nodes on 1,428 occasions; in 17 instances a minor secondary operation was necessary; the mortality was less than 1 per cent. Contraindications to operation are as follows: 1. If there is reason to believe that the lymph node infection is a blood-borne one. 2. If the distribution of the diseased nodes is haphazard and irregular, such a qualification being strongly suggestive of a blood infection. 3. If the disease is of the fibrous type. 4. It is inadvisable to operate in cases which have been previously treated by incision and curetting. 5. As a general rule operation is inadvisable in the first year of life. If periadenitis exists operation should be deferred until this has subsided under treatment with fomentations of a saturated solution of magnesium sulphate. If operation is done in cases of the lymphoid type described above, it should be followed by a series of exposures to X-ray therapy. If the child is toxemic, a short preliminary course of tuberculin is given prior to operation; the shock of the operation is thus lessened. The presence of abscess does not alter the indications for operation. The incision is so planned that it does not pass through the skin immediately overlying the abscess; the abscess cavity can be evacuated without any fear of infection of the wound surface; the underlying nodes are removed, and the abscess walls are sterilized with iodoform and bismuth paste. The postoperative results are as satisfactory as in an uncomplicated case. Four conservative measures are employed: general hygienic treatment, the external application of Moro's ointment in its varying strengths, Beraneck's tuberculin internally, and in the lymphoid type of the disease X-ray therapy.—*The Treatment of Tuberculosis of the Cervical Glands, J. Fraser, Brit. M. J., November 4, 1922, no. 3227, 858.*

Section of Superior Laryngeal Nerve in Laryngeal Tuberculosis.—Indications for the operation are a very advanced, hopeless condition, when death from thirst and starvation is imminent because of very painful swallowing. The laryngeal changes in the 12 cases operated on by the author consisted in infiltration and oedema of the epiglottis, arytenoids and aryepiglottic folds. Ulcerations of the laryngeal structures alone never necessitated a radical procedure. The Avellis technic was employed, one or both superior laryngeal nerves being severed. The patient is put in such a position that the laryngeal protuberance is protruding as much as possible. Under 0.5 per cent novocain-adrenalin local anesthesia, the skin, platysma and superficial cervical fascia are incised. The omohyoid and sternohyoid are drawn medially and the thyrohyoid is drawn laterally. The superior laryngeal artery comes now into view, running up to the middle of the hyothyroid membrane and immediately next to it lies the typically coiled superior laryngeal nerve. It is severed and the wound is closed in the

usual manner. After the operation the patient is kept on a semiliquid diet, as there is usually difficulty in swallowing liquids. It is also advantageous that during eating the patient sit with the upper part of the body leaning forward and with the chin resting on the chest. This position facilitates the closure of the rima glottis by the epiglottis. Of the 12 cases operated on, 7 died after 1½ months and 2 after 2¼ months, while one lived 5 months. Six of these patients had complicating pulmonary hemorrhages and 4 had spontaneous pneumothorax. The pain was abolished in all the cases and the patients gained weight temporarily. When pain returned it was due to the extension of the ulcerative process beyond the innervation area of the superior laryngeal nerve, as occurred when it extended to the tonsils and palate.—*Neurotomie des Laryngeus superior bei fortgeschrittener Kehlkopf-Tuberkulose, W. Teller, Ztschr. f. Tuberk., March, 1922, xxxvi, 35.*

Relation of Nasal Disease to Tuberculous Laryngitis.—Riviere has sought to determine the rôle of nasal affections in tuberculous larnygitis. He believes that the former are very frequently specific and that the swallowed nasal secretions infect parts lower down, sepecially the epiglottis, the ventricular bands and other more exposed parts.—*Riviere, Congres de le Soc. Francaise d'Oto-Rhino-Laryngologie, Paris, July 17–18, Reported in Presse Méd., August 2, 1922, xxx, 660.*

Electro-Cautery in Laryngeal Tuberculosis.—Medical treatment is of little avail in laryngeal tuberculosis. Curative measures are surgical, and electric cauterization will probably soon supersede other surgical procedures. Its great superiority probably depends on the fact that it induces revascularization of infiltrated avascular tissue; this rather than the destructive action of heat constitutes its chief therapeutic feature. The results observed on experimental animals show that a cauterization area is sloughed off by the formation of granulation tissue, and that there is a formation of new blood vessels. This, of course, improves local nutrition and offsets the action of toxins. All the localized tuberculous lesions of the throat and larynx should be treated by the electric cautery.—*The Use of the Electric Cautery in Laryngeal Tuberculosis, G. B. Wood, Surg., Gynecol. & Obstet., July, 1922, xxxv, 104.*

Tuberculous Laryngitis Cured by Heliotherapy.—Kowler reported a cure of laryngeal tuberculosis of the left vocal cords, accomplished by means of his apparatus for laryngeal radiation (*l'ouvre bouche insolateur du larynx*), a device for transmitting sunlight to the larynx through the open mouth. The patient was found by his physician to be well a year after treatment. —*Un cas de laryngite tuberculeuse guerié par l'heliotherapie avec l'ouvre bouche insolateur du larnyx, Kowler, Meeting of XXXIV Congres d. l. Soc. Francaise d'Oto-Rhino-Laryngologie, Paris, July 17–18, Reported in Presse Méd., Aug. 2, 1922, xxx, 658.*

Treatment of Pleural Effusions Complicating Artificial Pneumothorax.—In the calcium-starved body the intercellular and intracellular processes of resorption are inadequate, particularly in connection with new-formed tubercles and various exudates. In the tuberculous patient the body's chemical reactions, organic and possibly also mechanical and physical, are abnormal. There is a comparative deficiency of calcium and a comparative excess of sodium ions. This excess causes a retention of water in the tissues, while calcium salts have the reverse effect and also assist in the enzymic and resorptive processes of the body. In tuberculosis a weak heart and a low blood pressure may also contribute to the diminution of the body's resorptive capacity and to the inadequate excretion of water. Normal deep respiration aids in the alternate emptying and filling of visceral vessels and promotes the resorptive and secretory actions of the heart, kidneys, suprarenals, liver and pancreas; the superficiality of the respiration in tuberculous subjects tends to limit these effects. In such patients the altered osmotic condition of the tissues and the mechanical effects of stagnation must also hinder resorption. Other factors that interfere are overfeeding with carbohydrates, which causes water retention, deficiency of vitamines, and high atmospheric humidity which favors an increase in the water content of the tissues. General measures to remedy these unfavorable conditions include giving of foods rich in calcium and fat-soluble vitamine; the latter include codliver oil. Excess of common salt in the food is to be avoided and highly salted foods are soaked in water to withdraw the salt. Carbohydrates in excess are to be avoided. It is possible to rid the body of some of the sodium chloride with which it is embarrassed by administering potassium acetate, the interaction of the two salts setting free potassium chloride and sodium carbonate, both of which are excreted by the body. The sodium and chlorine lost may be replaced by giving 0.5 gm. calcium chloride with each gram of potassium acetate. The

following solution, designated *K*, is used: Calcium chloride, 30; potassium acetate, 60; water, 285. Regular, slow and deep respiration, occasionally keeping the chest expanded with the glottis open for a few seconds, is directed. Occasionally, after a fairly deep expiration, the glottis is closed and an inspiratory effort is begun so as to create in the abdomen a slight negative pressure. These procedures promote the functional activity of the various organs, make their system of drainage more efficient, and rob aerobic bacilli of their more important conditions of life. During 1921, practically every patient at the Lyster Sanatorium (Norway) has been treated with *K*, 5 cc. being taken every or every other morning in a glass of hot water. Every or every other evening 5 cc. of codliver oil have been given. As little salt as possible is given in the food and the breathing exercises described are used. The result has been that moist sounds in the lungs have disappeared more promptly than formerly and hemoptyses have been less frequent and less severe; tubercle bacilli have not disappeared from the sputum in proportion. Resorption and formation of cicatricial tissue are favored. It is occasionally advisable to discontinue treatment for a few days when there is a troublesome dry cough or when dyspeptic symptoms occur. Sodium bicarbonate is given as seldom as possible, and when the dose of *K* is increased in cases of pleural effusion, the urine is tested for albumin as a precautionary measure. To avoid pleural effusions with pneumothorax, high intrapleural pressures are not induced and small injections of 100 to 200 cc. are given once or twice a week during the first two months. In 1921 the effusions in five cases of artificial pneumothorax, treated with *K*, disappeared in two, one and one-half, three and one-half, one and one-half, and one and one-half months, respectively. In no case did albuminuria occur, and in only two cases was the effusion associated with a rise of temperature and this lasted only a few days. The results of treatment with *K* during the past year have been so prompt and uniform that the remedy may be said to be a specific. The fact that the effusions during the past year have given rise practically to no general reaction suggests that the treatment given has prevented the development of an unfavorable calcium-sodium balance.—*The Treatment of Pleural Effusions, Notably the Effusions of Artificial Pneumothorax. The Body's Resorptive Processes in Tuberculosis, N. Lunde, Tubercle, November, 1922, iv, 57.*

Eosinophilic Pleural Effusion.—But few cases of pleural effusion with a large number of eosinophiles have been reported in the literature, and the tubercle bacillus as the etiological agent has never been mentioned. A case history of eosinophilic pleural effusion in a woman aged twenty-two, presenting the usual clinical signs and symptoms of pulmonary tuberculosis, is given. The course of the disease presented no unusual features except that an examination of the pleural fluid obtained on admission to the hospital showed 550 leucocytes per cmm., 70 per cent of which were polymorphonuclear eosinophiles and 30 per cent small lymphocytes. The fluid obtained one week later showed 2200 leucocytes per cmm. and a shift in the differential count to 100 per cent small lymphocytes. A later tapping showed no further change. Two guinea pigs received intraperitoneal injections from the first fluid obtained. One animal, one month after inoculation, had a spleen from which typical acid-fast organisms were obtained. The other animal was negative. Even though most cases in which this type of pleural effusion is present have not been proved to be tuberculous, it nevertheless does not seem necessary to accept this condition as a distinct etiological type of pleural exudate, for it is well known that the etiological factor of most primary pleural effusions is the tubercle bacillus. It seems probable that a larger percentage of these cases are tuberculous in origin than the literature would lead one to suspect.—*The Etiology of Eosinophilic Pleural Effusion, N. E. Clarke, J. Am. M. Ass., November 4, 1922, lxxix, 1591.*

The Heart and Tuberculosis.—In order to apply scientific methods it is essential to have sufficient data. In tuberculosis records there is generally a lack of exact cardiological data which might be used to advantage in both individual and statistical study. Certain anomalies of the pulse are of not uncommon occurrence. The causes of tachycardia in tuberculosis are not always clear. Graphic records of the heart and pulse are valuable. Among other problems are to what extent is heart disease primary or secondary in tuberculosis, and what form it usually takes.—*The Heart in Connection with the Work of the Welsh National Memorial Association, G. A. Stephens, Tubercle, October, 1922, iv, 7.*

Case of Tuberculous Pericarditis.—A Senegalese had acute bronchitis and congestion of the lung bases. He grew rapidly worse and a pericardial effusion was discovered which on puncture gave negative cultures. He grew worse, and on the twenty-second day a pericardiotomy was done. The pericardium was thickened and

bloody fluid escaped under pressure. The wound was allowed to drain into the cellular tissue. It improved to a surgical cure by the end of a month. The lesions later exacerbated and the patient failed rapidly. Autopsy showed complete cardiac involvement and advanced tuberculous lesions, especially in the cervical and thoracic lymph nodes.—*Monchet and Manuel, Meeeting of the Soc. Méd. des Hôp. de Lyon, Reported in Presse Méd., June 24, 1922, xxx, 548.*

Tuberculosis of Oesophagus.—Guissez reported seven cases of this rare condition. Two were cases of ulceration of secondary origin produced by suppurating lymph nodes. Two were of the sclerocicatricial type.—*De la tuberculose d l'oesophage, Guissez, XXXIV Congres de la Soc. Francaise D'Oto-Rhino-Laryngologie, Paris, July 17–18, Reported in Presse Méd., August 2, 1922, xxx, 659.*

Tuberculosis of Stomach.—Two cases are reported. The first was of a primary and solitary tuberculous ulcer at the pylorus, which gave all the symptoms of pyloric stenosis and which was operated on as being a gastric carcinoma. The patient died twelve hours after operation. The second case was also operated on for pyloric stenosis. A tumor, the size of a hen's egg, and several enlarged lymph nodes were found at the pylorus. The hepatoduodenal ligament was shortened by fibrotic changes and the duodenum was drawn upwards and laterally, thus constricting the pyloric opening. One lymph node perforated into the duodenum. Death followed in eleven days. Autopsy revealed lymph node and intestinal tuberculosis, but not that of the stomach.—*Zur Kasuistic der Magentuberkulose, R. Höfer, Beiträge zur klin. Chir., 1922, cxxvi, 555.*

X-Ray Treatment of Chronic Tuberculous Peritonitis.—X-ray treatment was tried on 20 cases of tuberculous peritonitis, all reacting negatively to medical treatment, and cure was established in 13 cases and improvement in 7, while 3 died of complications. Ascitic fluid was not withdrawn; but, exposed to X-rays, ascites improved. Four cases were especially obstinate to the treatment and ran a very remarkable chronic course and yet, by the use of large doses of X-rays, cures were finally established.—*On X-ray Treatment of Chronic Tuberculous Peritonitis, Masaaki Hori and Kaoruwo Ikoma, Kekkaku Zasshi, March 1922, iv, no. 3, Abstracted from Japan Medical World, September, 1922, ii, 261.*

Surgical Treatment of Tuberculous Ascites.—Five cases of tuberculous peritonitis with ascites were treated by peritoneal tunneling with permanent subcutaneous drainage. An analogy is drawn between this method and the treatment of tuberculous pleuritis by the injection of small amounts of the aspirated exudate into the subcutaneous tissues which thus results in hastening the resorption of large exudates. In the permanent subcutaneous drainage, besides the purely mechanical action of this method, there is also the possibility of a curative action in the sense of an autoserotherapy. To attain an opening of sufficient permanence in the peritoneum the corner of a crosswise incision in the peritoneum is sewed externally.—*Ein Beitrag zur chirurgischen Behandlung des Ascites, spez. des tuberkulosen mit Peritonealfensterung zwecks subcutaner Dauerdrainage, F. Erkes, Arch. f. klin. Chir., 1921, cxviii, 164.*

Healed Case of Peritoneal Tuberculosis.—A twenty-one year old soldier with peritoneal tuberculosis received no benefit from numerous tappings and sunlight therapy. Fluid accumulated repeatedly and his general condition was bad with a remittent fever, lack of appetite and weakness. Opening of the abdomen revealed the peritoneum, small intestines and omentum studded with tubercles. There again occurred a decided ascites eight days after operation and tapping was repeated monthly. The ascites finally disappeared and the temperature became normal. Six months after the last tapping the patient recovered. —*Geheilter Fall von Peritonealtuberkulose, Jentsch, Centralbl. f. inn. Med., 1921, xlii, 50.*

Blood Picture in Surgical Tuberculosis.—Numerous tables made from the examination of the blood picture of surgical tuberculosis in a large clinical material is discussed. The literature contains few studies on this subject. It was noted that usually there is a slight lowering of the hemoglobin, the erythrocyte count and, with this, the color index. The leucocytes are increased in most cases. Frequently there exists a relative and absolute increase in the lymphocytes with a diminution of the neutrophilic leucocytes. This picture indicates a favorable prognosis. In severe cases there is an absolute neutrophilic leucocytosis to the disadvantage of the lymphocytes and a relative and absolute eosinopenia.—*Das Blutbild bei chirurgischer Tuberkulose, Riedel, Deutschr. Ztschr. f. Chir., 1920, clviii, 312.*

Diagnosis and Therapy of Surgical Tuberculosis.—The importance of histological examination in the diagnosis of surgical

tuberculosis is dwelt upon, and it is concluded that it is not necessary to establish diagnosis on the typical microscopical features of tuberculosis, but the demonstration of one or two factors proves the tuberculous nature of the case; for instance, giant cells or agglomeration of epithelioid cells suffices. Moreover, a microscopic examination of the exudates, X-ray examination, injection of tuberculin and Pirquet's test, as well as the pathological course, will aid in the diagnosis. As for therapy, even in surgical cases the preservative treatment should be first applied, avoiding resort to amputation or extirpation as far as possible. —*Notices on the Diagnosis and Therapy of Chirurgical Cases of Tuberculosis, Kwannosuke Suzuki, Kekkaku Zasshi, April, 1922, iv, no. 4, Abstracted from Japan Medical World, September, 1922, ii, 261.*

Primary Lesion in Joint Tuberculosis. —At present it is generally believed that in a large percentage of cases of joint tuberculosis the original focus is in the bone, usually near or at the epiphyseal line, and that the involvement of the joint is practically always secondary. Following invasion of the bone, the process extends toward the joint surface, causing destruction or absorption of the joint cartilage, and later resulting in invasion of the capsule. However, from a clinical standpoint this conception of tuberculosis has never been absolutely satisfactory; and it seems to be a clinical fact that a considerable percentage of cases seen at the Massachusetts General Hospital clinic could be classified as the synovial type of joint tuberculosis, especially if those cases are selected that are seen within a year after the onset of symptoms. If these same cases are examined during the third year after the onset they are then generally classified as tuberculosis affecting the bone. Pathological studies are usually not made except in the later stages of the disease, and this may account for the failure of pathologists to recognize the early synovial involvement. Clinical evidence is presented to support the view that tuberculosis of the joints has its origin in the capsule and that the involvement of bone is usually a secondary process. A few years ago, at this clinic, arthrotomy was usually performed on cases of suspected tuberculous knees, especially in adults, first for diagnostic purposes, and second, to make an attempt with iodoform oil to affect the tuberculosis. None of these cases showed any evidence of bone involvement that could be detected by X-ray studies or by operative inspection. The same cases later developed definite bone changes and progression of symptoms that led to excision; at this time they were typical examples of bony tuberculosis. In a case of early hip joint tuberculosis in an adult, an arthrodesis was done, and the joint capsule was found involved while the bone appeared normal. In knee cases the X-ray usually affords no evidence of a bone lesion during the first year. A slight amount of bone atrophy might be present, but this is also seen in other chronic infections. Generally, the first evidence of any bone involvement was a thinning of the articular cartilage and a slight irregularity of its outline, probably near the capsular attachment. There then followed a definite loss of cartilage or erosion of the surface, and only in later stages was there loss of bone substance. In two cases of tuberculosis of the spine, with definite symptoms, it took two years to demonstrate absolute bone destruction by the X-ray. In such cases the joint space is involved first, resulting in narrowing of the intervertebral space, possibly with an abscess shadow. Later, a loss of the articular surface, generally of two adjacent vertebrae, occurs, and a very late stage is the destruction of the body of the vertebra, although in children bone invasion may be rapid. It is fair to assume that tuberculosis in the knee is typical of any joint involvement. A laterial incision of the knee shows, at first, that the true capsule is greatly thickened, reddish and injected, usually with an increase in free fluid. The next step is the development of a reddish prolongation of the capsule, the pannus that begins to cover the inner surface of the condyle and extends over the articular surface of the femur; the process at this stage may simulate nontuberculous infections. Tubercles can be shown microscopically in the pannus and capsule. Later the pannus extends, followed by a thinning and loss of substance of the cartilage beneath it. The cartilage destruction is usually greater than appears in the X-ray picture. Lastly comes a loss of bone substance after the loss of cartilage.—*Pathology of Tuberculous Joints. A Study from the Clinical Standpoint, M. H. Rogers, J. Bone and Joint Surg., October, 1922, iv, old series, xx, 679.*

Diagnostic Errors in Bone and Joint Tuberculosis.—In inherited syphilis the process is nearly always bilateral, and in acquired lues on one side. In the latter frequently only animal inoculation with the joint effusion, which is flocculent in tuberculosis, will differentiate these conditions. The same applies to suspected rheumatism. In favor of gonorrhoea are an acute onset and intense pain. In the extremely rare case of shaft tuberculosis the differentiation

from osteomyelitis can be extremely difficult. Of great importance is the onset; and in osteomyletis more severe periostitic processes occur, and the sequestra are larger. The tuberculous sequestrum is characterized by a relatively poor lime content, so that in the roentgen picture it appears smaller than it actually is. In doubtful cases animal inoculation must be restored to. Finally, in bone tuberculosis there are found honeycomb transparencies without periostitic inflammation, which make it difficult to differentiate from *osteitis fibrosa*. Here the tuberculin test is indicated, as also in doubtful cases of Perthes' disease which otherwise, on account of the tendency to bowing, can usually be diagnosticated clinically.—*Fehldiagnosen bei Knochen und Gelenktuberkulose, E. Kisch, Arch. f. klin. Chir., 1921, cxviii, 481.*

Immobilization of Tuberculous Joints.—A number of efforts were made to immobilize joints with bone pegs taken fresh from the patient's tibia. Two operations on the tibiotarsal joint have given gratifying results; at the knee less satisfactory results were obtained, and it has been necessary to resort to secondary resection. At the sacroiliac joint the operation has succeeded so well that in two cases an error in diagnosis was suspected.—*Immobilisation des articulations tuberculeuses, Tuffier, Meeting Soc. de Chirurgie, June 28, 1922, Reported in Prog. Méd., July 8, 1922, no. 27, 323.*

Tuberculous Epiphysitis of Great Trochanter.—This is a case report of a very rare condition. A boy, ten years old, sustained trauma of the right hip. X-ray examination three months later showed some irregular bone proliferation of the right trochanter. Three months later he was seen by the author. At that time he had a tumor over the right hip, posteriorly and laterally. The superficial veins were enlarged, and motion in all directions was restricted and painful. The X-ray plates showed a definite area of bone destruction on the superior and exterior aspects of the right trochanter. This extended down the external border of the adjacent diaphysis. There were bone proliferation and islands of bone in the surrounding soft structures, definitely separated from the diaphysis and the epiphysis of the great trochanter. There was no change in the acetabulum, head of femur, or epiphyseal line for the head of the femur. The X-ray diagnosis was (1) neoplasm, destructive sarcoma, or (2) osteomyelitis, probably tuberculous. Microscopic examination of the mass removed at operation showed tuberculosis. The clinical and surgical diagnosis was degenerated sarcoma. Ten months later X-ray examination showed that the irregular bone which has been described was smooth, both on the femoral diaphysis and the epiphysis of the trochanter. There were a few islands of bone in the soft structures but with little infiltration.—*Tuberculous Epiphysitis of the Greater Trochanter, D. Y. Keith, Amer. J. Roentgenol., September, 1922, ix, 549.*

Tuberculosis of Ankle Joint and Tarsus.—In a review of the cases of ankle joint and tarsus tuberculosis that have been treated at the orthopedic clinic of the Children's Hospital, Boston, 88 cases are discussed. Trauma apparently played no prominent part in etiology; in only 3.5 per cent of the cases was there a history of exposure in the family. The diagnosis was based on the following facts: 1. The presence of bone or joint involvement of a chronic nature without a picture of an acute infectious origin or trauma and persistent protection of the joints involved. 2. X-ray appearances which were early suggestive, but not definitely diagnostic. 3. The presence of a positive Pirquet reaction. 4. Bacteriological and pathological reports of material removed at time of operation. 5. Frequently repeated negative Wassermann reactions. There were 43 cases treated conservatively by plaster fixation, Thomas ring splint, high sole and crutches, in this way protecting against the strain and mechanical pressure which the individual bones or joints are subjected to, while 45 cases were subjected to some kind of operation. From a comparison of the data of results it is concluded that operative treatment of tuberculosis of the ankle joint and tarsus in children is usually harmful. Time is not saved, deformity is not decreased, and motion is not preserved; when the infection is sharply localized so that a direct surgical procedure may be followed, it might be of distinct advantage to resort to careful excision. Unfortunately, at present this is not possible, and, therefore, most surgery is to be avoided. Incision of the soft parts in the direction of the supposedly affected bone or joint has not been of any benefit. The abscess, which presents itself and which spontaneously ruptures, generally protects the surrounding tissues from invasion and from overwhelming infection. The cases in the operative group that were followed by the quickest healing and usually by the best surgical results were those that had been submitted to small incisions of the fluctuating mass of an abscess about to rupture spontaneously. Heliotherapy definitely aids

before as well as in the presence of sinuses. A large proportion of these cases of tuberculosis get good functional results with very little deformity, but are more likely to get these results in a shorter time by nonoperative procedure.—*Tuberculosis of Ankle Joint and Tarsus, H. J. Fitzsimmons, Boston M. & S. J., December 7, 1922, clxxxvii, 838.*

Treatment of Pott's Disease.—The evolution of the bony changes is very different in the child and in the adult and this difference ought in great part to determine the treatment. In the child the cure of Pott's disease takes place by consolidation, generally without cavities or sequestra. The object of treatment is to permit consolidation, to favor and hasten it as far as possible and to prevent deformity during its progress, or at least to reduce to a minimum the external evidences of deformity. The best general measures consist in helio-marine therapy. Against the destruction of bone due to tubercle bacilli not much can be done directly; the lesions evolve by a slow and almost immutable process. Apart from good general hygiene and exposure to sunlight, there is no means to influence their evolution. But the mechanical destruction of bone, the alterations due to compression, may be in great part prevented. In the child, the classical treatment of rest and immobilization suffices and is even superior to surgical treatment. The patient should always lie prone either on the back or the belly with or without a sustaining wedge. If the disease is lumbar or lumbosacral the recumbent position alone is enough; if it is dorsal there should be, besides, a corset or a cast with an opening for compression; if it is cervical or suboccipital a cast is necessary. The treatment ought to last till the anatomic cure is complete, a point not always easy to determine. Two means of judging exist: (1) the duration of the disease; three years at least ought to be allowed for its evolution, but as the beginning is often unknown the time can be calculated only approximately; (2) X-ray evidences; the evolution may be followed by radiographic examinations, which for most situations are almost decisive; the exception is disease in the interscapular regions. But, since it is not possible to say absolutely at what time the anatomic repair and the compensation processes are completed, the patient should begin to walk very gradually, at first in a cast, passing later by different stages to more movable supports which should be worn for some years. The question of a graft or of posterior ankylosis arises at this stage. It might be done conveniently enough, except in young children, but it has no particular advantage since, at this time, consolidation may be assumed to have taken place. Two important complications may occur: 1. Abscesses, which should never be opened and which, if possible, should be prevented from opening; they should be punctured and no antiseptic injections ought to be made. 2. Paraplegia: for this there is nothing to do but to maintain an immobilization as complete as possible. Spontaneous cure is the rule, and in the cases where recovery is attributed to intervention it would doubtless have occurred had nothing been done. In adults one rarely sees the great destruction that takes place in the vertebrae of children. The vertebral bodies undergo spongy excavations which often contain sequestra that may become the starting point of abscesses; but their gross form is on the whole preserved. After the active phase, repair does not take place, as it does in children, by consolidation of healthy bone and by breaking down and removal of diseased parts. The cavities persist, filling up very slowly. They may contain sequestra and cheesy deposits for years. During the extremely long period of repair the lesions are only latent, not extinct. The imminent possibility of their recrudescence determines the treatment. General treatment is the same as for the child, and should be even more strict. Rest in bed, with or without corsets, should continue through the active phase, but, since the risk of deformity is slight, and casts are endured with difficulty by adults, these may be omitted. During the active period surgical intervention is useless as a means of influencing the tuberculous lesion, and it may have the bad result of giving a false security. The disappearance of clinical signs indicates that surgical intervention may be useful. The two important modern operations are those of Hibbs and Albee. Hibbs's operation, otherwise serviceable, has the drawback of being very long. For this reason Albee's operation should be preferred. Exceptions to the rule that surgical intervention should be tried only after the active period ends are cases where the disease is suboccipital. For this operation Tuffier has devised a modification of Albee's operation. Cases may arise when surgical intervention is logical in young persons, as, for example, when, for lack of proper treatment or any cause, ankylosis is not complete, and the disease persists into adolescence. In certain cases of great deformity surgical treatment is likely to be useless or harmful.—*Quelques considérations sur le traitment du mal de Pott. Traitement classique—Traitement chirurgical, E. Sorrel, Presse Méd., May 3, 1922, no. 35, 378.*